MAY 13 1921

In This Issue—*Repair Parts Stock*

MOTOR AGE

Vol. XXXIX
Number 19

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, MAY 12, 1921

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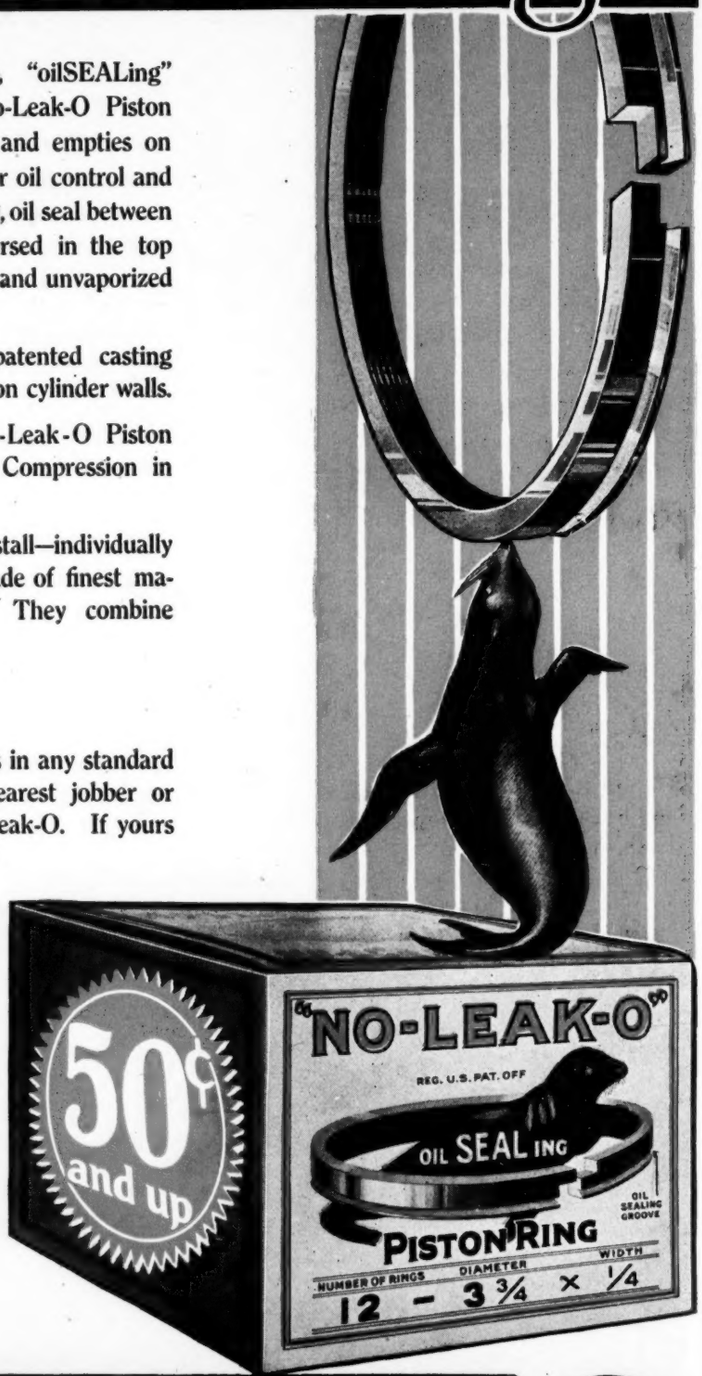

NO-LEAK-O Piston Rings
WITH THE ORIGINAL OILSEALING GROOVE

AUTOMOTIVE EQUIPMENT ASSN.

MOTOR AGE

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Vol. XXXIX May 12, 1921 No. 19

CONTENTS

Parts Stock a Big Factor in Service 7

One Hundred Thousand Miles Without Service 10

Turn a Vacant Lot Into Money 12

Dealers—Help Your Motor Club 13

Vocations as Truck Sales Index 14

A Simplified Flat Rate Plan 16

Practical Tire Merchandising and Repairing—Article II 18

Makes of Tires to Handle.

News of the Industry ..... 21 to 31

DEPARTMENTS

How the Electric System Works—Article V 32

Better Business 34

Automotive Architecture 36

The Readers' Clearing House 38

The Accessory Show Case 44

Service Equipment 45

The Automotive Repair Shop 46

Law in Your Business 47

Weekly Wiring Chart 48

Passenger Car Serial Numbers 49

Specifications of Passenger Cars, Trucks and Tractors ..... 50 to 53

Coming Motor Events 54

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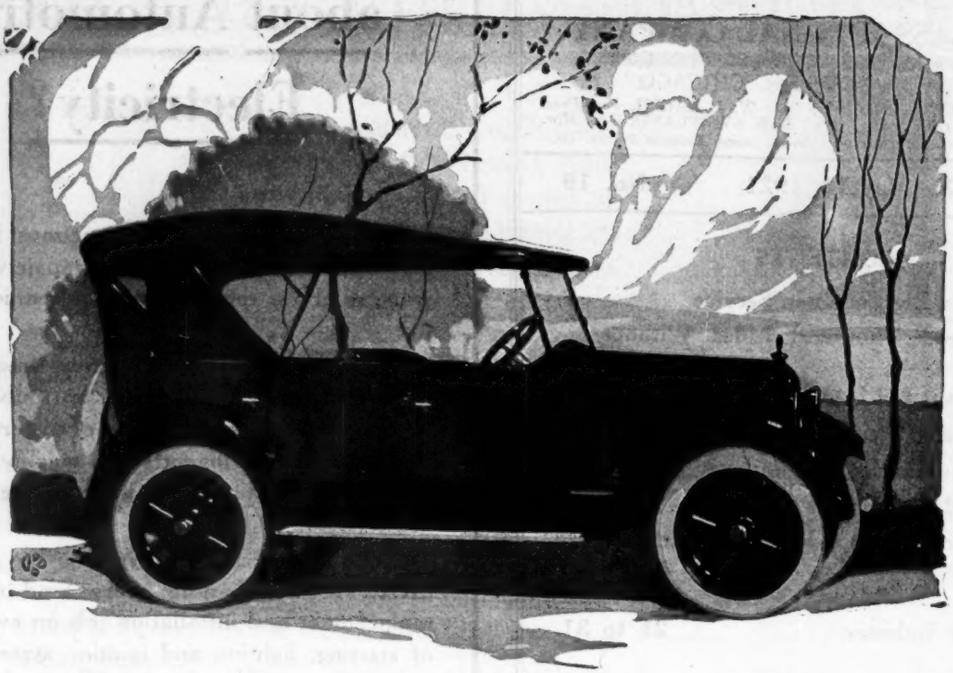

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THE R&V KNIGHT is one of the few cars which this year is exceeding materially its sales record for the first half of 1920. Popular last year, this distinctive car is one of the sensational sellers of the present season. In the Chicago territory, sales since January 1, 1921, have been three times those of the same period of 1920.

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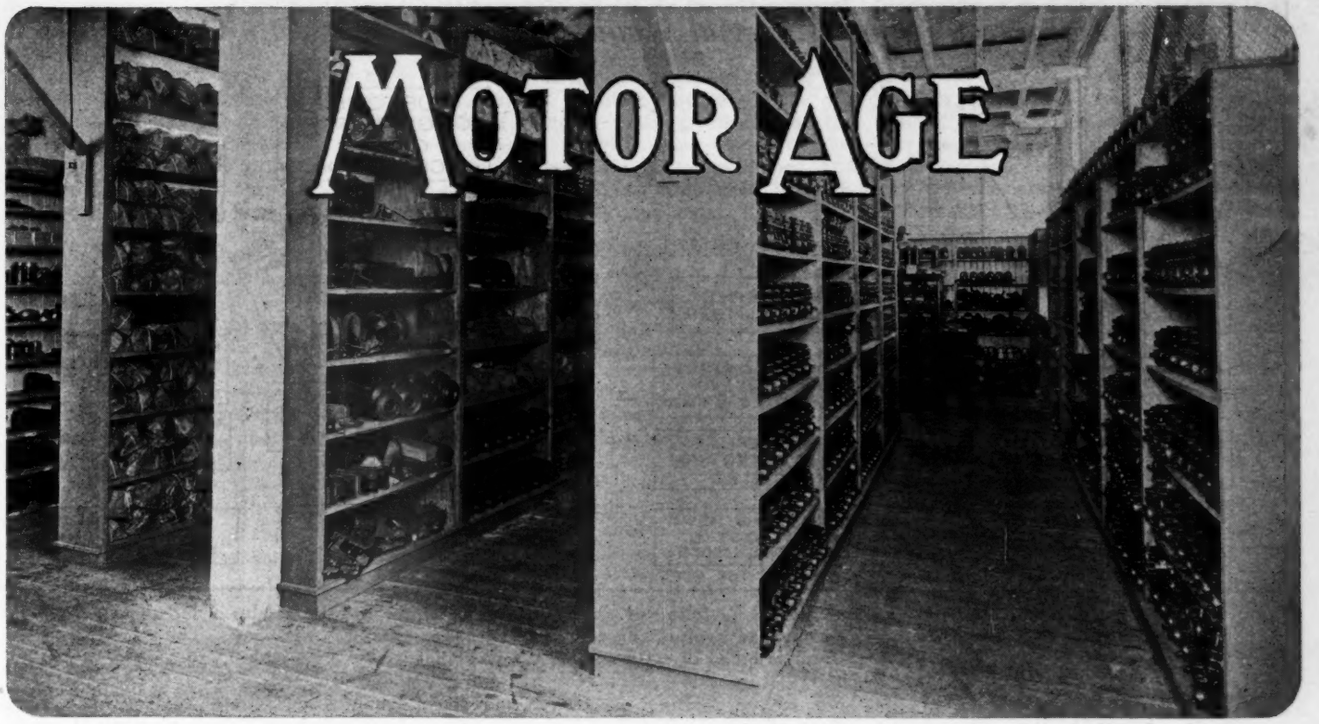


Appearance is an important factor in stockroom management. A stockroom manager always should bear in mind he is selling goods to the public the same as a department store. The sales section, and every other section, should be kept orderly and clean. Customers like to do business with a house that has a progressive appearance. The stock sales clerks should be neat in appearance. Remember the scope of repair parts business only can be increased by good methods

Parts Stock a Big Factor in Service

Accurate Records Essential for Sound Purchase — Size Controlled by Sales — Transportation Important

NO automobile, truck or tractor has been developed to such a high state of perfection but what it becomes necessary in time, depending largely upon the design, workmanship and handling of the vehicle, to replace certain parts or units. Wear is bound to take place in certain parts of the engine, clutch and the rest of the chassis, which in time means the dismantling of the unit and the substitution of new for worn parts. In many cases this state of affairs is hastened by carelessness on the part of the driver and other similar contributing factors. All of which brings us to the subject of the parts business as it affects the rest of the dealer's organization.

There is a direct relationship between service and parts. One cannot exist without the other. You may be willing and have the facilities for rendering the best service in the world, but all this will not help you if you have not an adequate supply of parts, and, what is more, have them at the time when they are needed. In other words, there must be an accurate means at hand in any dealer's service station large or small for determining the size of the stock carried, purchases, stock turn-over, etc. Especially does this become important when we realize that there are now over 9,000,000 motor vehicles in this country and more coming on all the time.

Parts Service Analyzed

1—The service parts stock is the determining factor in automotive service.

2—The size of the stock is controlled by the parts sales and the number of cars in the dealer's territory.

3—Parts purchased from the factory should be based on the sales records of the previous six months.

4—Suitable stock records are necessary to prevent the accumulation of inactive parts.

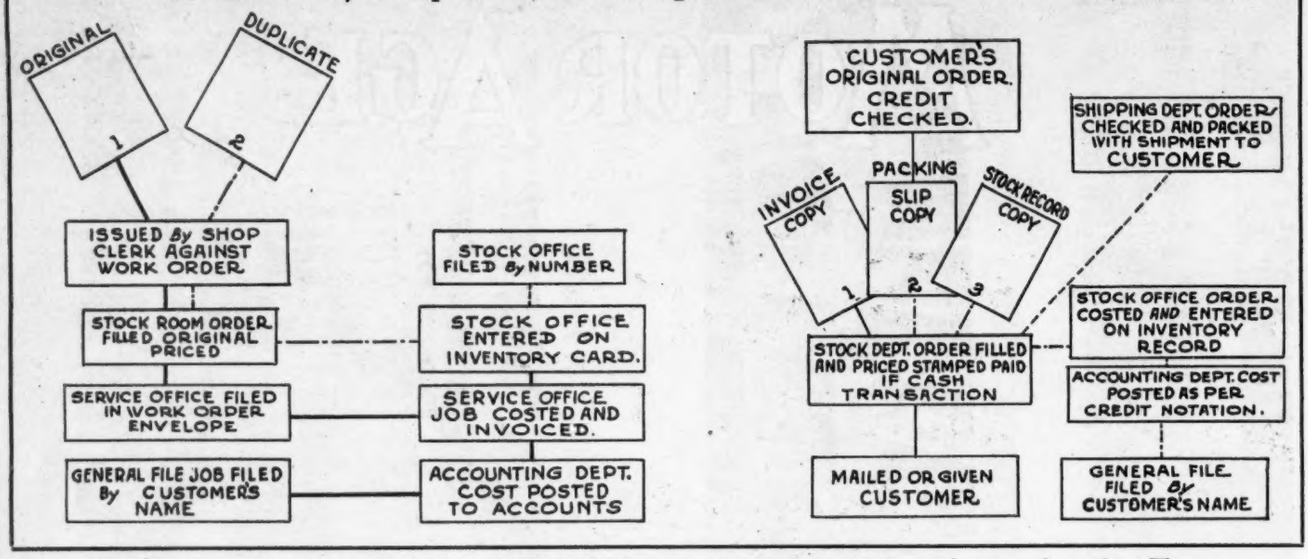
5—Inactive parts mean no sales and a consequent lack of turn over.

6—Anticipate the parts demand and use the cheapest mode of transportation.

During the past year makers have not made cars in such numbers as heretofore and naturally the manufacture of parts suffered likewise. We may then expect to see in many cases not only an actual shortage of cars, but parts for those cars already in the hands of users. We have said that the repair parts stock is a service necessity, therefore let us see how the dealer can best take this thing in hand so that this part of his business pays him the right sort of dividend.

Distributors in some parts of the country who have many dealers frequently carry stocks in excess of

The Route of Shop Material Requisition and Parts Sale Order


ORIGINAL
1
DUPLICATE
2
ISSUED By SHOP CLERK AGAINST WORK ORDER
STOCK ROOM ORDER FILED ORIGINAL PRICED
SERVICE OFFICE FILED IN WORK ORDER ENVELOPE
GENERAL FILE JOB FILED By CUSTOMER'S NAME
STOCK OFFICE FILED By NUMBER
STOCK OFFICE ENTERED ON INVENTORY CARD.
SERVICE OFFICE JOB COSTED AND INVOICED.
ACCOUNTING DEPT. COST POSTED TO ACCOUNTS
CUSTOMER'S ORIGINAL ORDER. CREDIT CHECKED.
PACKING SLIP COPY
2
INVOICE COPY
1
STOCK RECORD COPY
3
SHIPPING DEPT. ORDER CHECKED AND PACKED WITH SHIPMENT TO CUSTOMER
STOCK DEPT. ORDER FILLED AND PRICED STAMPED PAID IF CASH TRANSACTION
STOCK OFFICE ORDER COSTED AND ENTERED ON INVENTORY RECORD
ACCOUNTING DEPT. COST POSTED AS PER CREDIT NOTATION.
MAILED OR GIVEN CUSTOMER
GENERAL FILE FILED By CUSTOMER'S NAME

This chart shows the routes which should be followed on the stock requisition and parts sales order. The requisition is a house form and is charged against the cost of repairs being made in the shop. The sales order is billed directly against the customer

$100,000. This represents the major portion of a distributor's investment and naturally must be managed well in order to be prosperous. In an institution of this kind carrying as large a stock as this the parts manager is just as important a person as the sales manager. The personnel of the stockroom should be second to none. Its organization and method of business should be such that it could fill 95 per cent of the orders without having to go to the source of supply.

Many of the car, truck and tractor manufacturers furnish their distributors and dealers with parts order forms on which to send in their stock requirements and to help them in other ways. One of the greatest problems the automobile manufacturer has in its parts department is educating the dealers to order parts in proper quantities and to carry sufficient stock to properly service their owners without over stocking. Cooperation with the factory is essential. Every effort should be made by the dealer in the routine of business with the factory to follow the latter's suggestions and thus lessen the waste of energy at the source of supply. The factory should not be asked to make continuous C. O. D. shipments to dealers when the parts should be in the stockroom.

THE MINIMUM SUPPLY

One of the American car manufacturers in speaking of the parts situation says the dealer should carry a maximum of six month's supply and a minimum of three month's supply, both of these factors based on previous sales. One of the great troubles is that the dealer does not record his sales on maximum and minimum cards to determine the quantity to order. The amount of stock a dealer should carry should be based on the number of cars in his territory to be serviced by him at from $15 to $45 per car, depending, of course, on the class of car.

Various methods are in vogue for controlling the stock of the distributor. Some specify the amount of parts in dollars and cents a distributor or dealer should carry in proportion to the number of cars in the territory. These values per car for different prices of cars are about as follows:

Under $1,000	$ 8 to $10
$1,000 to $1,500	10 to 15
1,500 to 2,000	20 to 25
2,000 to 2,500	20 to 35
Over $25,000	40 to 50

Others specify the active parts that should be carried. Each plan has its drawbacks. Under the first mentioned plan the distributor or dealer may stock the required amount in dollars and cents but not the parts for which there is the most demand. The latter plan is designed to overcome this objection.

In laying out a stockroom it is preferable to divide the organization into several divisions each one having its particular field. Thus a typical stockroom organization would consist of a parts manager, who is the centralized source of control for the entire organization, assisted by purchasing, stock records, orders, shipping, and return goods department.

Any stockroom record system centers around the perpetual inventory card. One of these is made up by a part number for each part in the stockroom and is a summary of the sales and distribution of this part. The danger limit or minimum number of parts to be carried in stock is determined by the number of sales over the limit decided as a safety factor. This data also classifies the parts into active and inactive groups. Inactive parts should be kept to a minimum as they have the least turnover and, therefore, the least profit. While a certain list of repair parts may be satisfactory for the central states a portion of this same list would be classed as inactive in the mountain states.

In planning the stock room and its equipment the following should be observed:

1—Proper location of departments so that parts orders will flow through progressively.

2—Economic location of bins with reference to available space, stock activities and weight of parts.

3—Proper size and type of bins for various classes of parts.

4—Proper binning of parts by model or items.

5—Accurate and rapid method of locating parts.

6—Proper protection for valuable and painted parts.

NEEDS DIFFER

A forced plan in which the manufacturers specify the parts that should be carried if handled as a blanket proposition for the dealers all over the country may simply load up some of them with a lot of parts for which they have no use, while in other cases it may be entirely satisfactory. If a forced plan of this kind is to be used it may be well for the makers to zone the country in such a way that the trouble with parts is common.

It seems unwise to attempt to generalize the parts demand over so large an area as the United States with so many changing conditions.

Parts should be ordered from the factory on a standard order form with which, as stated before, nearly all factories supply their representatives in the field. This form standardizes the method of handling an order at the factory and

avoids the confusion that would result if every dealer were to use an order form of his own makeup.

This factory parts order form is made in duplicate, the original being mailed to the factory and the duplicate retained by the dealer to be entered upon the inventory card in his order section in the date, order number, and amount column. When parts are received from the factory they are checked off in the received column from the packing slip after the shipment has been verified by the shipping clerk. This packing slip also is used to check the factory invoices before payment is made.

Parts received or returned are to be added to the balance column entered in red and the distributions are shown in black. This simplifies making entries on the card and reduces the possibilities of error in the balance. Reference to the cards regarding a past transaction is also simplified.

THE MEASURE OF EFFICIENCY

Stockrooms largely can be judged best by their ability to fill orders. Good performance would mean that a stockroom was able to fill from 95 to 98 per cent of its orders on demand. This form can be made up daily or weekly as the amount of business warrants. The total number of orders filled is shown in bulk and the orders delayed are listed, the day's delay also being shown. This form generally is made up in three copies, one for the manager, one for the stock department and one for the service department.

Parts are distributed through the repairshop material requisition over the counter and through the mails. The shop material requisition generally is made in duplicate, the original going with the work order after it has been priced and the duplicate remaining in the stockroom to be deducted from the inventory record. Counter sales or outside shipments are handled on a parts sales form which is made up in triplicate, the original is the customer's invoice, the duplicate the packing slip, and the triplicate for the stockroom record. Four copies of this type of form are sometimes used and an acknowledgment copy used in addition to the three mentioned.

CALCULATING THE DEMAND

In addition to the bin location being shown on the inventory card a special location book generally is used in large stockrooms. This consists of the part numbers being run consecutively in one column with the bin location number opposite each part number. Given the part number it is comparatively easy for one to locate the part by referring to this location book.

Good judgment is a thing the parts manager most needs. There are two classes of demand on a stockroom, actual and fictitious. It is upon the actual demand that orders must be based. The fictitious demand is misleading. A customer might come in and ask for a part that is seldom sold and just because the dealer does not happen to stock this part is no reason why four or six of these parts should be ordered from the factory. A better way is to examine the sales records of the last six months and determine the number that have been sold. If but one of these parts has been sold then the logical number to order from the factory is two. Thus after delivering one of the parts to the customer there will be one in the stockroom which would be the proper number to carry under the circumstances.

If parts are bought from the factory on the strength of the fictitious demand the factory may make the same kind of a purchase. It in turn may load itself with a lot of parts for which there is no demand and then in the course of time the concerns ordering parts in this manner will attempt to return them to the factory for credit. Certainly a factory should not be made a dumping ground for the errors of its field representatives. The factory should, therefore, suggest the business systems for the dealers and distributors to follow that it may itself be protected.

Usually parts lie around for a long time in a poorly managed stockroom before discovery is made that the parts are not needed. Then an attempt is made to return them to the factory. Sometimes the factory has made the parts obsolete and they are a dead loss to the distributor simply because business methods were not used in the stockroom. In any event the distributor is going to suffer loss, as he must pay the transportation charges both ways and in all probability the factory will make a charge for handling these parts which no longer are active.

A factory is justified in placing a limit upon the length of time a distributor may carry parts and still be able to return them for credit. Such an action is a good thing for both. A factory cannot afford to carry the burden of mismanagement of its representatives. It is a source of great expense to have a dealer order parts from the factory without a sound reason for doing it.

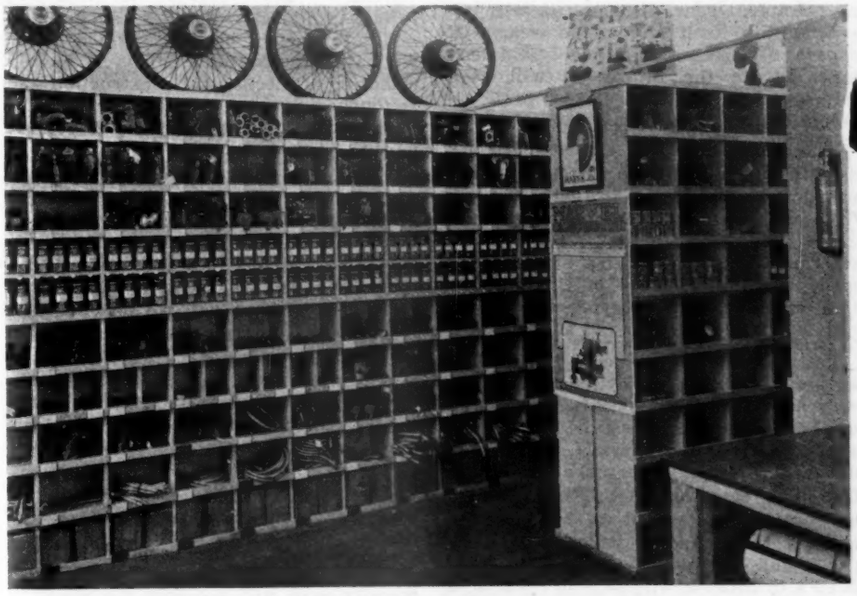
ORDERS SHOULD BE TYPEWRITTEN

All orders should flow through the stockroom progressively. The general routing of orders to the stockroom should be such that there would be no duplicate travel and the order would travel straight through from start to finish without having to reverse its direction at any time. This not only saves time but also saves confusion in filling an order. In this respect dealers should be educated to properly execute orders before they are mailed for fulfillment. A distributor should educate his dealers to typewrite all orders and have them complete in their specifications.

These orders should all be written on a standard form supplied by the distributor, preventing the necessity of reinterpreting the order upon its receipt at the distributor's stockroom. Much time can be saved in checking and interpreting orders if they are made out properly at their source. It is up to the distributor to see that the dealer complies with these instructions.

Continual telegraph orders for active parts is admission of poor management. It is an uneconomical means of ordering parts, as it usually requires that parts be shipped by the most expensive means of transportation, namely express. Most factories are flooded with telegraphic and telephone orders. In fact, from 15 to 30 per cent of the orders received in a day will be either of these two means. While a telegram or telephone call does reach the factory sooner it does not expedite the shipment of the parts from the factory. In fact, a telegram loses some time right at the start,

(*Concluded on page 30.*)



Proper protection for valuable parts, especially those of small size, is essential in keeping down the depreciation or loss in the stockroom. Above is shown the stockroom of one concern in which is shown the small bottles all carefully labeled which hold the small carbureter parts

One Hundred Thousand Miles Without Service

With the Development of Certain Appliances Now Approaching Perfection Wear and Factors Causing Wear Will Be Materially Reduced

By ROY E. BERG

WILL our cars of the near future run 100,000 miles without service? Judging from the work that is being done in the laboratories throughout the country at the present time, it is the writer's opinion that our cars can be made to run this distance without adjustments of any kind except such attention as is necessary to tires, batteries, and other little things that the owner can do himself without sending the car out for expensive overhauling.

Of course this subject is naturally a service consideration. Those who feel that the production of the type of car that would operate 100,000 miles without any service would be the means of robbing a great many service stations of their source of livelihood forget that the volume production cars are necessarily the inexpensive machines and these makes are necessarily limited in the amount of extra equipment that can be placed on the cars.

WILL BE APPLIED TO COSTLY CARS FIRST

The class of car that we are considering here must necessarily be the costlier types, and until the innovations and departures from standard practice worked out for these machines have been reduced to inexpensive contrivances and placed on a large production basis the inexpensive machines will not be within the classification as outlined here. Therefore the service man need not worry over being out of work for some little time to come.

To produce a car that will run for 100,000 miles without major service we must first eliminate wear as far as possible. To do this three major factors must be worked out toward a successful coordinated end. These factors are:

1—The material used in the construction of machine.

2—The exclusion of all dust and foreign material from the working parts,

3—The perfect lubrication of the moving parts.

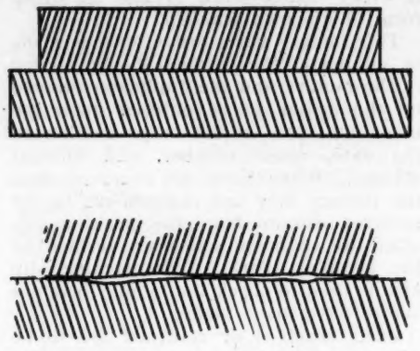
Wherever any parts are in contact with each other and there is motion there is friction. So naturally there is wear. The thing remains, therefore, to make the surfaces of all wearing parts as smooth as possible, and then since it is impossible to make a theoretically perfect surface, the material on which the wearing surface is made must be as hard as possible. Thus the material will oppose within itself any undue wear. Of course, all these things are being done now, but in the future we will have improvements on these already well developed engines and parts.

The creation of an almost perfectly smooth surface and the selection of the proper materials to make these surfaces from will in itself help the situation a great deal. How to improve the materials on which the wearing surfaces are made is another phase of the problem that engineers are studying very carefully at this time.

Let us take the cylinders of an engine as an example. The cylinders are not very hard, relatively speaking, compared to the hardened surfaces of the crankshaft, but there are ways and means under consideration to make these surfaces of greater hardness. One engineer has proposed a method to chill cast the bore of the cylinders which will make the metal extremely hard. In finishing such a cylinder it will have to be ground to size. Such a procedure would make the metal hard enough to last through 100,000 miles of travel undoubtedly, providing of course, that everything else that promotes wear is considered in the construction.

Having done everything to the metal that will tend to reduce wear we must next consider the construction. If two pieces of metal are rubbed together there is wear. If the pressure on these two pieces is 1,000 lb. and there are 2 sq. in. of bearing surface between the two pieces of metal, the intensity of pressure is naturally 500 lb. per square inch.

If on the other hand the surface is increased to 4 sq. in., the intensity of pressure is reduced to 250 lb. per square inch. If we still further increased the area and so reduced the intensity of pressure between these two surfaces the wear would be accordingly reduced. Therefore, it remains to make the bearing surfaces as large as is possible without making the design too bulky. Then the construction will also favor longevity.



Surfaces however smooth when examined under a high powered microscope show that irregularities exist. The prime necessity exists therefore to fill up these irregularities with a lubricant and thus reduce friction

Next we must exclude all dust and foreign material from these surfaces to maintain perfect bearing surfaces after we have created them. This is merely a matter of mechanical construction and is touched upon at length later on.

The metal of the bearing surfaces is now correctly proportioned, the surfaces are perfectly smooth, dust and foreign material has been excluded and it remains, therefore, to lubricate the bearings. Since it is not possible to create absolutely perfect bearing surfaces on this earth we are going to have wear regardless of how well we lubricate the bearings and, therefore, small metal particles are going to be worn from the bearings and these particles will get into the oil and, therefore, in order to maintain good lubrication the oil must be purified constantly.

CARBON FOUND TO BE 75 PER CENT DUST

Let us start with the engine for it is there that most of the wear occurs. The foundry man will see that the metal in the cylinders is made very hard and durable. The pistons will not be so hard, of course, because a good bearing is not composed of two metals of like hardness. The machine shop man will see that the bore is ground perfectly smooth and accurate and the combustion chamber as free from pit marks and blemishes as human skill can make it.

So called carbon deposits are a good deal different in composition than their name indicates. An analysis of any carbon from a motor car, and particularly a truck, will show that approximately 75 per cent of the material is road dust. It seems logical, therefore, that if the dust was eliminated most of the "carbon" would also be eliminated and this is one of the big factors that will aid us in making our cars run 100,000 miles.

Dust drawn in through the carbureter and mixed with the gasoline vapor forms a very good grinding compound. This is just what is happening in the engine at all times. The dust mixed with the gasoline is grinding the heart right out of the engine, causing the cylinders to become elliptical in shape and the piston rings to be worn in their grooves. Soon the wear has become so intensified that the gasoline runs down by the piston rings and carries the dust with it. The result is that the bearings of the crankshaft, the connecting rods, and the camshaft soon revolve in a mixture composed of oil, carbon and dust. The carbon and dust, of course, is not present in very large quantities but there is enough there so that in 30,000 miles of travel it is necessary to take up the bearings two or three times.

A good air cleaner or washer is, therefore, an essential to this car which is to run 100,000 miles. This air cleaner or washer must be fool proof. It must not throw the collected dust up into the air column when the car or truck hits a very hard bump. It must be very accessible so that the owner will not fight shy of the task of emptying the dust collector, and the cleaner must be efficient. It must remove the very finest dust because this is the material that does the damage.

FINER ATOMIZATION IN CARBURETION NEEDED

Now with an air cleaner on the engine, the carbon deposit will be reduced about 75 per cent. The wear on the bore will be very much reduced. The wear on the piston rings will hardly be noticeable in 50,000 miles of travel. Further than this, the tightly fitting piston rings will not allow the gasoline to leak down into the crankcase as much and since the dust will not be present either above or below the crankcase the oil will not be turned into a cutting compound.

However, even though we do remove the dust from the incoming air and so reduce the wear, we will not completely seal the combustion chamber from the crankcase because present day fuel is too heavy to permit its being burned when it is not completely atomized.

Then the operation of the choke is not the best by the average owner and the result is that the engine is flooded when starting. The gasoline runs into the engine more like a rain torrent than an atomized mixture and the result is that some of the fuel burns, some is blown out into the muffler and the rest leaks down into the crankcase.

Therefore, there is a need for finer atomization in carburetion, which will reduce very materially the tendency of the fuel to dilute the crankcase oil.

Even though we do atomize the fuel to a very finely divided state, some people will persist in abusing the engine by pulling the choke all the way out and flooding the engine anyway. Therefore, there is bound to be some crankcase dilution but engineers have figured out a way to avoid this by refining the oil as it is being used.

It is the intent of certain groups of men to place on our cars an apparatus that in appearance is something like the

(Concluded on page 37.)

Selecting Gasoline Dispensing Equipment

ACCURACY in the handling of gasoline and other liquids for the motorists is one of the problems that constantly faces a dealer. The filling station giving genuine service and accurate measure to its customers is destined to grow in the estimation of the motorists who frequent the vicinity. The dealer who uses an inaccurate system for dispensing gasoline loses, ultimately, whether he short measures the customer or short measures himself. If he short measures the customer he creates enemies and his volume of business rapidly falls. If he short measures himself his profits are eaten up through the inaccuracy of the measuring device.

The proper selection of the type of fuel dispensing systems is one of great importance and in this consideration there are five fundamental factors to regard:

First and foremost is	——Accuracy
Second	—Reliability
Third	—Safety
Fourth	—Speed
Fifth	—Economy

As to accuracy; the only way to insure absolute measurement is to place complete dependence in mechanically operated gages. An gage, be it of the visible type, or any other type that is regulated by the judgment of the operator, is not absolutely accurate.

Where it is necessary to depend on the sighting of the top level of the fuel within the container, as measured by graduations on the container, the possibility for inaccuracy is always present. In the chemical laboratory, extreme accuracy of measurement is obtained on graduates and other chemical flasks by narrowing the neck of the container so that a very small amount of liquid will give a perceptible difference in height and then, by placing extremely fine, hair-line graduations upon the flasks. Where further accuracy is required, the containers are graduated to be accurate at certain temperatures only.

Judging from the great pains that are taken to make chemical apparatus accurate, as seen above, it is very easy to appreciate that where the graduations on a visible system are one-quarter of an inch wide and the diameter of the container something like eight or nine inches, that the operator might easily vary the height of the liquid in the container at least one-quarter inch without the owner appreciating that he has lost or gained, perhaps, as much as a pint.

THE MEASURING GAGES MUST BE ACCURATE

Reference to the increased business resulting from this type of equipment was made in the April 7th issue of MOTOR AGE. The inquiries naturally arising therefrom presents several angles on the situation which make it possible to present a further discussion of the subject in this article.

Such visible dispensing systems that automatically measure the quantity of fuel by mechanical means are certainly desirable, provided the other conditions, as stipulated above, are complied with.

Experience points to the fact that where visible systems are employed, the sale of gasoline increases many times. Unless, however, the measuring gages are absolutely accurate, this increased business will be but a temporary increase for the public soon becomes "wise," as the saying goes, and it will not allow itself to be cheated long.

The standard piston type of measuring pump does not depend for its accuracy of measurement on the judgment of the operator. He has but to raise the piston the distance between the stop on the adjustable screw and, since the diameter of the piston is accurately measured and its stroke is accurately determined, there is very little need to doubt the correctness of the measure.

Reliability is also an important factor to consider in selecting the gasoline dispensing equipment. Such conditions as weather changes should not affect the equipment. Also, sufficient protection should be provided as will insure the instrument against undue breakage. In the case of visible systems, the container should be well protected. The service consideration from the manufacturer of the equipment is important for, if troubles arise, the manufacturer's service department, or that of his dealer, will be able to replace any broken parts.

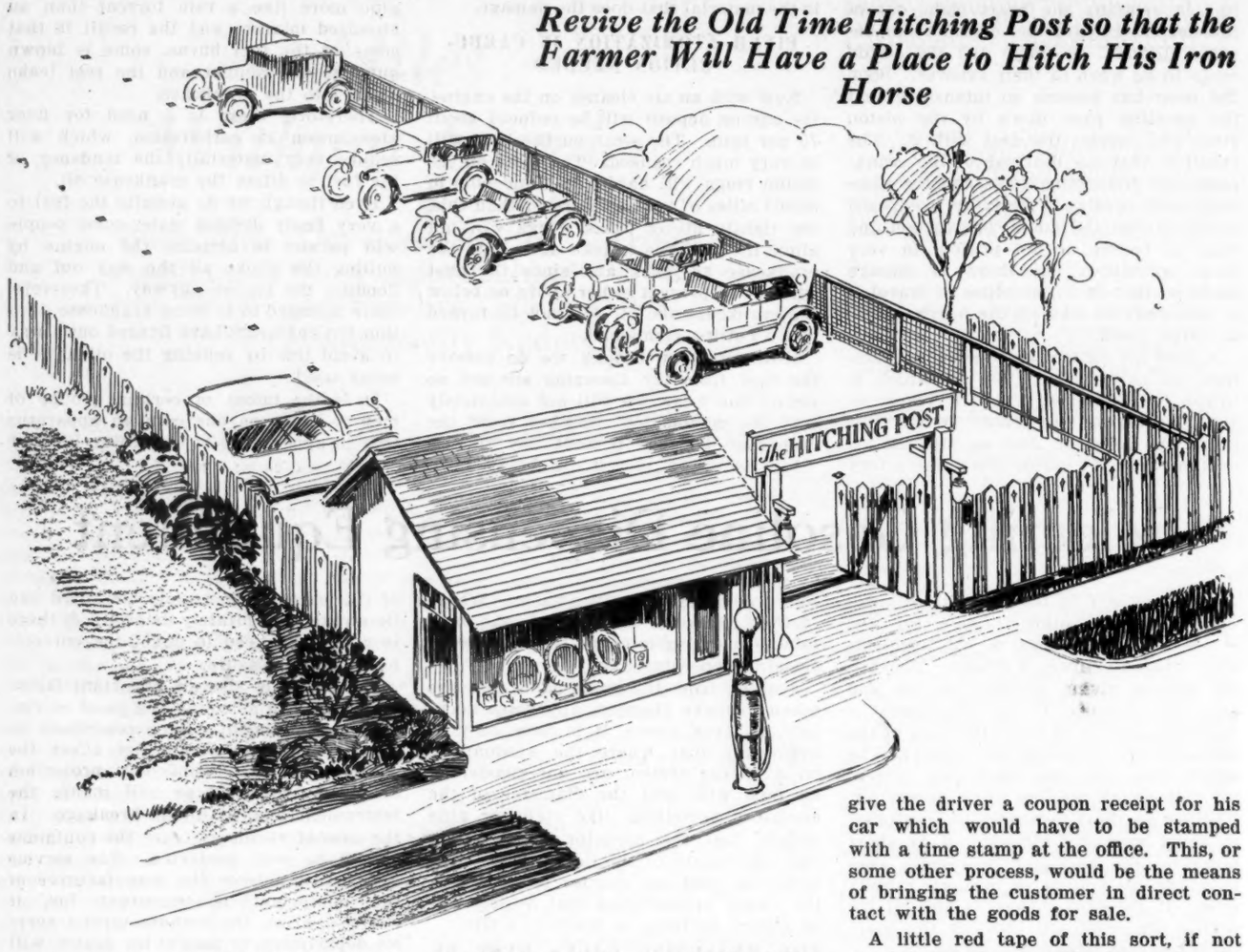
Safety is important insofar as the apparatus does not increase the danger from any already existing hazards. It is well to compare the prospective equipment with the fire insurance underwriters' rules and also, any local legislation that may have been passed in this respect.

Speed of operation, especially where the service station is located in a very busy section, is well worth considering. Too much time should not be spent in the recovery stroke of the pump if it is manually operated. Where the level of the liquid in glass containers must be carefully brought to a certain point by manual means and by sighting, the speed of operation is apt to be somewhat reduced.

The fifth consideration of economy, as outlined above, concerns the factor of profit. An installation that is not economical will eat up the little profit that it is possible to make when handling gasoline. Of course, an attendant is necessary to operate most every type of pump. There are some automatic types of the slot machine variety but these are not used very extensively as yet.

Turn a Vacant Lot Into Money

Revive the Old Time Hitching Post so that the Farmer Will Have a Place to Hitch His Iron Horse



DRIVING through the bustling small or medium sized town on a busy afternoon, we are struck by the number of farmers' cars that line the curb in every direction. These cars clutter up the main streets and are exposed to injury the greater part of the day or afternoon. Some of the more particular drivers go to the garage where they get storage for 25 to 50 cents and run no risks of damage.

In the old days back in the eighties and nineties these towns all had hitching posts where the farmers could tie up their steeds to stamp their feet and switch their tails until Mr. and Mrs. Farmer had finished their business and were ready to start home. In those days, Mr. Farmer went to town once a week at best and the hitching posts were quite an asset to the owner of the general store.

If he could make it easy for the farmer to tie up his team in a safe place, the chances were good that the storekeeper would sell the farmer most of his week's supply. As the town grew and the country became more thickly populated, the hitching posts became more of a nuisance than an asset and, upon the acquisition of motor cars by the better class farmers, have gradually disappeared. Now with most of our country friends owning motor cars and coming to town every day or two, the congestion in small towns is very great.

Very often there is a big vacant lot on the main street, just before entering the business section and it is our proposition that this be turned into a "hitching post" for motor cars. A lot 50 by 100 ft. would accommodate 30 cars and tend very materially to reduce congestion. A very small charge for storage, if any at all, would be in order, but the main revenue would come from the sale of gasoline, oil, tires and accessories which could easily be made if goods were properly displayed.

Pump Should Be Outside

The gasoline pump should be outside on the curb so that sales could be made to passers-by as well as to those who entered the enclosure.

Another way of bringing customers in contact with the goods for sale would be to make it necessary for them to pass through the office on their way out. The boy in charge of the yard might give the driver a coupon receipt for his car which would have to be stamped with a time stamp at the office. This, or some other process, would be the means of bringing the customer in direct contact with the goods for sale.

A little red tape of this sort, if not carried too far, would also make the owner more confident of the security of his car. The investment would be very slight in comparison with the cost of a garage. The accessory store and office might be only a small frame bungalow in the front corner of the lot. One could start business with only the lot and the gasoline pump, adding accessories the second season, or when convenient.

To get the most out of a layout of this kind, however, it should be pretty complete and all possible advantages used. The run of ideas is to use the gasoline pump as a feeder to the storage yard and when the customers enter the yard, make them stop at the accessory display. The accessory display should also be on the lowest side of the lot so that it will be most convenient for the purchasers.

The lot for best results should be from 50 to 55 ft. wide with room for two rows of cars with an aisle between. It could also be 100 ft. to 110 ft. for four rows and two aisles. These are the most economical widths for accessibility to all cars but other widths could be used.

If the ground is soft, clay or loam, it

(Concluded on page 37.)

Dealers—Help Your Motor Club

Cooperation with the Local Motoring Organization Can Be Made to Increase Business—Below Is Told How the Waterloo Club and the Dealer Have Mutually Benefited by Working Together

THERE is a distinct advantage to be gained when the dealers of a city get behind and push the local motor club. Most of the large centers now have their dealers' organizations it is true but, in a good many instances, the dealers are not so quick to get behind a community movement that, in the long run, means more business for the dealers.

A recent example of what can be accomplished in the formation of a motor club backed by the dealers of the town is that of Waterloo, Iowa. The automobile dealers of Black Hawk and Waterloo county believe that they will benefit by promoting the welfare of the club because there naturally will be an inducement for more traveling by motor car and a consequent greater purchasing of accessories, tires and automobiles.

The officials of the club do not demand that members patronize any one dealer but they do make investigations to determine the business ethics and methods of the dealers for the protection of members. For example: it is required that service stations keep their floors clean of glass, oil, rubbish, tacks and similar materials detrimental to tires. It is also essential that a standard scale of prices on repair operations be maintained. This is purely a protective measure and one that meets with the approval of honest and well meaning dealers.

The prices asked for repair work for towing and for tires and other accessories are not, in any way, determined by club officials but the club does desire and demand that a knowledge of such prices be imparted in order that a dealer may not overcharge any member of the Waterloo club or any tourist who is a member of a club which is affiliated with the A. A. A.

CLUBS STIMULATE MOTORING AND BUSINESS.

It has been proven, in other cities where motor clubs are thriving, that such clubs stimulate motoring and this, of course, means increased business for the dealer and accessory dealer. We show a photograph of the patrol car furnished the Waterloo Club by the Morris Motor Car. Co., local distributors of the Cadillac. This dealer realized the value of this general service to motorists and donated the car. The patrol cleans from the streets an average of one bushel of glass and other rubbish detrimental to tires daily. The up-keep of this car is made possible without cost to the club through a local tire service, a battery service station and one or two other institutions.

Another thing which the club is doing and which is of vital interest to dealers is the sending out, early every morning, a scout car to inspect the principal highways leading into the city. Therefore, by the time the majority of people are ready to start on a trip or if a dealer has one or more customers who may be tourists enroute and who desire road information, this will readily be available from the fact that the club is in contact at all times with the dealers.

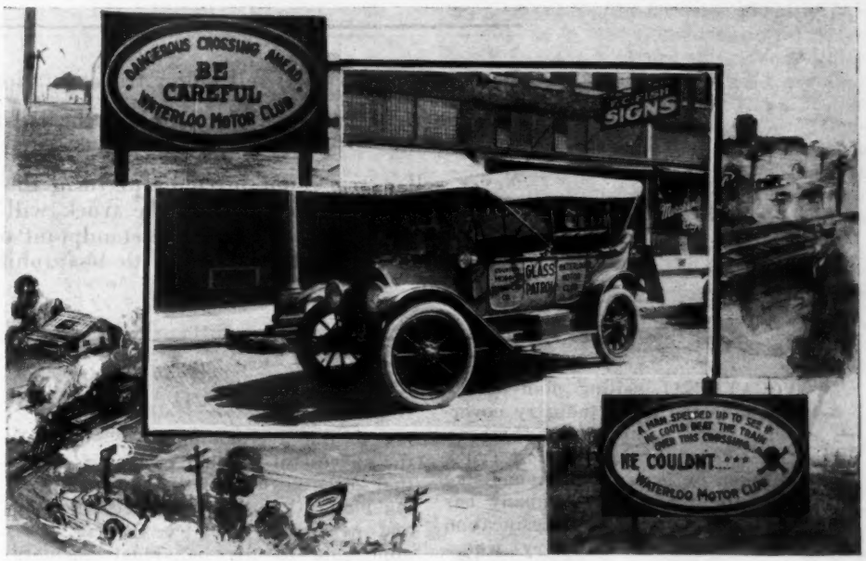
The scout car has been traveling within a radius of 100 miles of Waterloo for the purpose of lining up dealers and service stations which will act as authorized repair shops for its members. This is substantially the same plan of operation as followed by motor clubs in some of the larger cities.

As an example of how one of the local dealers feels in regard to the work of the club the following, taken from a letter written by this dealer to Mr. L. V. Strothman, president of the Club, may be cited:

"Permit us to offer, as our appreciation of motoring, the maintaining in 'spick and span' condition of your new scout roadster during the season ahead. To this end, we have prepared and enclose ten orders on our service department which will entitle the club to the best possible cleaning, washing and polishing of your roadster upon presentation of one of the orders each time this service is required.

"This organization is a going concern already known throughout the middle west and a factor in northeast Iowa car driving. Their touring service now available and becoming in great demand will place the outside service stations firmly in the minds of tourists who will undoubtedly depend on these while enroute.

"We can see no reason why the official service station emblem on our dealers' windows will do other than command attention from both local and touring car owners for the heavy driving season just ahead."



Service to the Motorist by Club and Dealer

The car shown above was furnished to the Waterloo Motor Club by the Morrison Motor Car Co., local dealers. This car picks up an average of one bushel of glass each day. It is easy to see the harmony that is engendered among motorists, dealers and the club and the resulting betterment of business. Also shown above are signs erected by the club to warn motorists

He Found Where Tractors Were Needed

Harry Shultz, general manager of the Elmer Automobile Co., Hartford, Conn., distributor of Ford and Fordson keeps a weather eye open for prospects and does a little scouting now and then in quest of business. On one of these little expeditions he connected with a large tobacco plantation and stated his case which netted the sale of eight tractors which were put to work one-hour after being unloaded from the cars.

Vocations as Truck Sales Index

One Manufacturer Shows Dealer's Elements of Proper Salesmanship in Order That the Job May Be Profitably Fitted and Every Owner Placed in Position of Being Satisfied

Don't sell just trucks; sell motor transportation.

Sell the right truck for the job; sell the right man the right truck.

Never sell a truck not fitted to perform the work for which it is purchased; either the truck will not function properly from a mechanical standpoint or the cost per ton-mile will be so high as to be prohibitive and inefficient.

By Warren Baker

A VOCATIONAL selling plan as applied to the truck industry covering these points, among others, has been evolved by the Duplex Truck Co. and taken by it as its merchandising policy for the year. The company has compiled a vocational classification which includes every industry where motor trucks have been used to profit, grouped and classified, after a thorough analysis, according to its particular haulage needs. These groupings range from producers and refiners of petroleum, manufacturers of heavy chemicals, paints and fixed oils to general transportation and storage with such vocations as theater, motion picture producers and picture film exchanges; public institutions and the like embraced in them.

What proper application of this plan is aimed to do from the standpoint of selling is:

The elimination of highway-and-by-way methods of making motor truck sales and the bringing of selling down to the methodical, scientific foundation.

The taking of the salesman out of the salesroom to spots where real, active business can be found.

The furnishing the salesman with a workable basis for a prospect list that is fundamentally sound.

WHAT VOCATIONAL SELLING IS INTENDED TO DO

The actual results, as appearing on the books of the truck dealer, from the vocational selling plan are expected to be:

1—Increased sales.

2—More substantial sales.

3—New business of a stable character.

4—Elimination of the majority of unprofitable sales; trucks by this method will stay sold for if the plan is properly used it will be unnecessary to take back trucks because of non-payment or because of unprofitable operation.

Nothing is more important or interesting to the average business man than the successful conduct of his business—that is the keynote of the vocational selling plan. Offer him helpful suggestions and constructive advice that is really applicable to his individual business; show him how he can make more money; advise him how he can operate his business at less cost and you will find yourself welcome when you call on him with the ultimate object in view of selling him a motor truck; but, tell him on first meeting that your truck is mechanically superior to any other truck on the market, that, in fact, your truck is the best in the world and he probably won't want to see you again. He has heard this same story before. The two questions that interest the business man who is in need of transportation are—"Will the truck do my work properly?" and "How much money can I save by its use?"

Therefore, the company holds, the business man who actually needs transportation, whether he be a laundryman, a printer or a paint dealer, should be sold on the need of transportation in his particular line of work with the motor truck as the means to that end.

"Assuming that every business man is interested in his own business problems," the company says, "it is obvious that the best method of approach should be along the lines of familiarizing yourself with the business man's individual transportation problems." This means that the marketing of motor trucks must be done on a basis which will necessitate a comprehensive survey of the transportation needs of the individual prospect—and the vocational selling plan makes provisions for such a survey.

Elements entering into the plan and contributing to its success are these:

A study of the sales territory and analyzing it on the basis of vocations.

Getting close to the prospect's individual vocation so that it can be fully understood and may be applied to the truck that is being handled.

Forgetting the mechanical features of the truck until the need for transportation in the prospect's particular vocation, if he has need for it, has been sold.

The analysis of truck sales during the past year or any other year will probably show, in a great measure, that a large percentage of the unprofitable sales were those where the truck was not fitted to fill the prospect's requirements; where the buyer came to the dealer and sold him on a long term purchase plan or where a salesman forced the sale of the truck without knowing or making sure that the buyer needed or could afford the truck or that the truck was not properly fitted for the work it was intended to perform. The vocational plan of selling is intended to meet this situation.

THE SALESMAN MUST STUDY PROSPECT'S BUSINESS

The classified list of vocations furnishes the dealer and the salesman with a workable prospect list. It shows them in what lines of work motor trucks have been used. In order to gauge the demand for trucks in any particular territory, the vocational plan shows, the dealer or salesman must have a direct, personal and intimate knowledge of each individual industry, knowing the product manufactured or handled, the daily volume, how it is handled—whether in bulk, boxes or packages—the facilities for loading and unloading, length of the haul, kinds and conditions of the roads, facilities for giving mechanical service to the units, the financial standing of individuals or firms and a great deal of other detailed information all of which is essential so that the proper kind of truck and the proper equipment may be supplied. The demand is not gauged, as

in passenger car selling, by the population of the district, the wealth per capita and the number in use per capita as a basis of calculation. As a general rule, therefore, the company does not regard the present motor truck owners in any territory as the best prospects unless they are considered purely from the standpoint of the industries they serve and the added outlets gained by the present use of motor trucks in those particular vocations. In short, the motor truck dealer and salesman must become students of transportation.

When the salesman presents himself to the prospect on his first visit, the plan prescribes that he must impress on the prospect that—

He is not there to sell trucks but rather to make inquiries in reference to the prospect's business.

He is not calling as a motor truck salesman but as a sales engineer to aid him in reducing his haulage or delivery costs and to counsel with him regarding motor truck transportation in general.

He is representing a company whose endeavor is to place motor truck transportation on its proper basis—a company which is not anxious to sell motor trucks to whoever might buy but rather to make sure that every individual business which has actual need for a motor truck may secure the proper kind of equipment to take care of his need economically and properly.

Personal study and scrutinization of the most careful kind must enter into the selection of prospects if the highway-and-byway method of selling, or the picking up of orders anywhere regardless of whether a truck may be considered a profitable investment for the purchaser, is to be eliminated. The data necessary for a good working prospect list cannot be obtained from city directories, telephone books or stereotyped information. It must come through systematic analysis of the district according to the vocations found in it.

VOCATIONAL ANALYSIS UNCOVERS REAL PROSPECTS

After such an analysis, with vocations as a base, it will prove surprising to learn how many real prospects there are that the dealer or salesman never thought to exist, for every vocation classified in the company's compilation will sooner or later be in the field of motor transportation. There are without question a number of vocations which have never appealed to the dealer as being users of trucks and there are others which are in need of trucks and would buy them if the proper equipment were supplied and a completed plan could be worked out to prove to them how the truck could be profitably handled.

The classification is of great help in differentiating between names and prospects. No name, says the company, should be considered a prospect until a sufficient investigation of the man's business has been made to determine whether or not a truck is really needed. Not every business man is a prospect; some business men think they are; some are quite sure about it and some are not. When it is settled that a truck is needed the name becomes a prospect. To list these prospects there may be two card files, a temporary one compiled from a personal analysis of the territory but eliminating such firms and industries as the dealer or salesman is convinced have no need for motor truck transportation and an actual prospect file which holds only such names as the dealer or salesman is personally and actually in touch with and with whom he will be coming in contact.

Vocational Selling

TOO many trucks have been sold in the past with only one aim in mind—to sell them. Owners as future prospects for more trucks have not been considered by many dealers. Unless the truck is made to fit the job and to be a profitable investment for the purchaser the selling of it ultimately will reflect seriously on the truck industry as a whole. The dealer himself will suffer in the end and so will the manufacturer of the particular truck he handles.

The Duplex Truck Co. feels that through the vocational plan of selling elements that have tended to restrict the wide expansion of the truck business may be eliminated and that this elimination may be accomplished has adopted a program which will bring the manufacturer and the dealer organization into close cooperation in putting across the selling of trucks where they are needed and can be used with profit.

The company under the vocational selling plan maintains a constant and helpful cooperation with the dealer and salesman. After the territory has been analyzed and it is seen what prospects are likely to develop the salesman presents himself to the prospect in the role as mentioned above and secures from him full information of his business as it concerns transportation. He does not talk truck at the first meeting and he refrains from telling about the mechanical features of the product he is handling. He establishes a personal business touch.

Having secured the desired information the salesman informs the prospect that before any truck or special equipment can be recommended for his purchase the data obtained must be sent to the company's sales research department where transportation engineers will go over it with a view toward making an individual and close survey of the hauling problems of the prospect. Upon this survey will depend the recommendation of what equipment is advisable or whether the prospect really needs motor transportation.

The research department makes a study of all the various elements and conditions entering into the successful selection and operation of the proper motor truck so that it may answer unequivocally the two most vital questions in the truck's relation to the buyer: "Will the motor truck selected do the work for me?" and "How much money will it save for me in my business?" It bases its conclusions on the information that the dealer or salesman forwards on a questionnaire provided for that purpose and on other facts which are forwarded by the dealer from time to time when called upon. To aid in this analysis the country has been divided into fourteen zones so arranged as to correspond with varying conditions in these localities as regards roads, climatic changes and general methods of hauling merchandise.

When the questionnaire reaches the sales research department a survey is made to contain—

A general analysis of the prospect's business as indicated by the questionnaire.

A cost chart showing the cost of operation of such equipment as his needs require, not compiled from some other part of the country but from the same zone in which the prospect is located.

Testimonials of users who are employing their equipment for the same kind of work.

Illustrations of the exact type of truck and equipment which the company proposes to furnish.

Supplements showing the mechanical details of such equipment.

This survey will be bound in a neat portfolio cover and the prospect's name, address and vocation placed on the cover.

NEED FOR TRUCK MUST EXIST BEFORE SALE IS MADE

"Unless the truck can be properly and profitably used," the company holds, "we would prefer that our dealer did not make the sale, because it is most evident that misapplied use of the truck only brings loss to the dealer and bad repute to the manufacturer behind them." And it adds that, "A truck improperly sold or misapplied is bound sooner or later to come back into the dealer's possession. Nine times out of ten the customer is sore over trucks in general and particularly the make of truck he has been using so that the salesman in addition to losing his commission, loses a good booster and customer and the dealer loses the profits on the sale."

The vocational plan of selling is looked to to obtain prospects for the dealer, to educate the salesman in the proper presentation of the subject to the prospect and to sell the right truck to the right person so that it can be used profitably.

A Simplified Flat Rate System

Read How the Tate Motor Co. Has Evolved a Fixed Price Plan Which Operates with the Minimum of Forms and Detail and Has Cut Service Costs

AN old saying is, "Too much detail makes an office boy out of an executice," and this axiom has been applied intelligently in the development of the flat rate system of service used by the Tate Motor Co., St. Louis, Mo. This system might well be termed "A flat rate plan without red tape." The forms used have been reduced to a minimum and small details eliminated wherever possible.

The rates have been carefully worked out on a time basis only and the figures are so close that the variation either way is never more than fifty cents. Parts necessary in completing a service job are obtained by requisition from the parts department and charged to the customer. The mechanics are paid on straight time without a bonus and if the work is unsatisfactory and must be done over the mechanic must do it at the sacrifice of his own time. That this system is successful and efficient is proved by the fact that this organization is doing work at a lower cost than some of the larger service stations.

Service as worked out by this company is an exclusive department and has absolutely nothing to do with the other departments. If adjustments are necessary or some particular type of service is requested by the sales department, it must be turned over to the service manager and left to his judgment. If the service work itself involves coming in contact with the car owner after the job is delivered, the investigation is entirely in the hands of the service manager.

MET BY SERVICE SALESMAN

A car coming into the service station is, first of all, turned over to the service salesman. He makes a careful examination of the car and determines what work is necessary. When conditions are complicated, and expert advice is necessary, a tester is called to offer his suggestions. The service salesman then fills out a form which has a place for the name, date, address, car number, license number and mileage and lists the service work to be done. It is then turned over to the service manager who is enabled to fill out a working form for the shop superintendent. This is made up very cleverly in the form of an envelop so that all instruction cards used in connection with the service operations can be slipped into the envelop and retained until the car is ready to leave.

This form is made out in duplicate and signed by the car owner who has the opportunity of seeing what service operations are necessary, what they will cost, and about when the car will be ready. The original is kept in the service manager's office and the duplicate sent to the shop superintendent. The work is then divided up according to departments and a tag issued by the shop foreman stating the details of the work is slipped into a protected case and attached to the radiator of the car. This card has a place for the name, license number, card number, car number, time promised and mechanic's number.

This is done to avoid any delay should the superintendent desire to locate a car or determine what kind of work was done and also prevents any slip on the part of the mechanic should he fail to finish the job at the promised time. The fact that this tag is always with the car makes the mechanic absolutely responsible and his instructions are that if it is impossible to finish the job the service manager should be notified so that proper arrangements can be made with the car owner.

The time required on the job is taken care of by a timekeeper who has the form issued to the shop superintendent and filed according to the mechanic's number. When a man starts or completes a particular job his time card is turned over to the timekeeper and the entry made on the superintendent's form. The parts necessary for the job are itemized on the back of this form and a requisition made out to obtain the parts from the parts department. The original form which was made out by the service salesman is retained in the service manager's office for the purpose of keeping track of all the jobs in the shop and their location at all times.

Very often a car owner will call up and ask when his car will be ready. If it is not known in which department the car is the job must first be traced all through the shop before an answer can be given. To overcome this difficulty these slips are placed on a board and when the car goes from one department to another the superintendent notifies the office so that an entry can be made on this slip which will permit locating the car quickly. After all of the work is completed the car is given a test by the expert tester and receives his O.K. after which the job is turned over to the customer. The billing is then completed by the business department, and the only thing they know about the entire transaction is that the bill is so many dollars and cents.

The service manager retains a form which includes only the essentials such as time, job number, invoice number, mileage, parts, hours and cash. This card is filed according to number and provides a means of quick tracing in case of complaint. If more details are necessary they can be obtained by drawing a shop superintendent's form which is filed according to job number. In case of a complaint, all forms pertaining to the job are drawn from the files and given to a service salesman enabling him to talk to the customer intelligently.

CONTINUOUS PERSONAL CONTACT

The desire to render real service is demonstrated when this service salesman goes to see a customer about something that has gone wrong and in most cases the result is a satisfied customer sold on the system of service employed. Instead of conducting a follow up by mail system of keeping in touch with the customers in a territory, this organization sends out a man who spends all his time systematically making calls on all Dodge Brothers owners in the territory. This service salesman discovers how an owner likes his car, and how it is running and gives advice regarding necessary repairs.

It is his duty to drive every one of the cars and make a thorough investigation so as to keep the customer satisfied with his car. The kind of service this man is giving is shown by one of his calls on a company owning a fleet of Dodge delivery wagons. Some of these cars were in need of new piston rings and the proprietor wanted one of his mechanics to do the work rather than have the job sent out. The mechanic did not, however, thoroughly understand fitting the piston rings and the service manager immediately arranged to assist him the following day. This kind of personal contact keeps a man sold on the car he owns and drives and on a dealer's system of doing business.

The Fixed Price

THE efficiency and good will building possibilities of the fixed price system of charging for service work is generally accepted. Not only is the car owner pleased at having a definite price quoted him before work is started but through this plan it has been found possible by some dealers to lower the cost to the owner. The compilation of prices, however, is the greatest difficulty attached to adopting this plan and dealers are usually reluctant to share them with their fellow dealers. We have the Tate Motor Co., St. Louis, Dodge Bros. dealers, to thank for the permission to use the prices shown on the opposite page and many dealers will, no doubt, find them valuable in starting a plan of their own or in comparing them with the prices they usually charge.

Schedule of Prices for Service Operations on the Dodge Brothers Car Used by the Tate Motor Co., St. Louis

1. Clean carbon	$ 2.00
2. Tighten starter chain	1.00
3. Tighten starter sprocket	10.00
4. Replace starter sprocket	13.00
5. Cleaning carbon and grinding valves	6.00
6. Tightened main and connecting rod bearings	12.00
7. Clean and adjust carbureter	1.50
8. Replace piston rings	13.00
9. Replace wrist pins and bushings (Tighten main bearings, $8.00 extra.)	13.00
10. Replace rings, wrist pins, and wrist pin bushings (Tighten main bearings, $8.00 extra.)	17.00
11. Drain and refill crankcase	.50
12. Repacked water pump	1.00
13. Adjust tappets	1.00
14. Adjust plugs and points	1.00
15. Rebush fan	3.00
16. Replace motor gears	13.00
17. Take end play out of pump shaft	2.80
18. Replace rear engine support	11.50
CLUTCH—NO. 2	
25. Wash out and "dope" clutch	1.25
26. Reline clutch—4 plates	11.50
27. Reline clutch—3 plates	11.50
28. Reline clutch (CONE)—old style leather	11.50
29. Replace clutch grease tube	.50
30. Replace clutch throwout bearing—new style	11.50
31. Replace clutch yoke—old style	11.50
32. Take end play out of clutch	11.50
TRANSMISSION—NO. 3	
40. Replace transmission gears or bearings	12.50
41. Replace pin in high speed gear	2.50
42. Replace or repair universal	8.00
REAR AXLE—NO. 4	
45. Take end play out of drive shaft	4.50
46. Welding torque tube	15.00
STEERING—NO. 5	
50. Rebush steering, replace eccentric bushing and worm shaft, adjust drag link	7.00
51. Replace pins and bushings in front axle, tie rod and adjust drag link	8.00
52. Free up and adjust steering device, drag link, tie rod, King pins and arms	7.00
53. Tighten steering device in frame	4.00
SPRINGS—NO. 5	
60. Replace bushings and bolts in front springs	7.00
61. Replace bushings and bolts in rear springs	8.00
62. Replace front spring	1.50
63. Replace upper rear spring	4.00
64. Replace lower rear spring	1.50
65. Tighten spring shackles and saddles	2.50
FENDERS—NO. 7	
70. Replace front fender	3.50
71. Replace rear fender	3.00
BRAKES—NO. 8	
75. Adjust both brakes	1.50
76. Free up and adjust both brakes	5.00
77. Reline foot brakes	7.00
78. Reline hand brakes	7.00
79. Replace keys in brake supports	4.00
80. Replace new brake pawl rod	1.00
81. Replace new ratchet	1.00
82. Replace brake release springs	.75
GREASING—NO. 9	
90. Lubricate springs with "spring Ez"	.50
91. Grease universal; transmission; rear axle and clutch bearing	3.00
92. Fill all grease cups—old style	1.50
93. Fill all grease cups—Alemite system	1.00
94. Grease wheel bearings—wood wheels	1.50
95. Grease wheel bearings—wire wheels	2.50
96. Oil and grease all over, wood wheels	4.00
97. Oil and grease all over, wire wheels	5.50
WINDSHIELD—NO. 10	
Open Cars	
100. Replace upper windshield glass	1.50
101. Replace lower windshield glass	1.50
Closed Cars	
102. Replace upper windshield glass	4.00
103. Replace lower windshield glass	4.00
GENERATOR—NO. 11	
105. Replace brushes; bearings and turn down commutator N. S.	7.00
105. Replace brushes; bearings and turn down commutator O. S.	10.25
107. Replace starter switch	2.50
108. Repair starter switch	4.25
PAINTING	
Painting coupe	$140.00
Painting sedan (Renickel parts, $10.00 extra.)	160.00
Paint, re-enameled hood and fenders	
Sedan	200.00
Coupe	175.00

Genelite Porous Bearing Metal

DEVELOPMENT of a new bearing material which is a mixture of high grade synthetic bronze and graphite, having self-lubricating qualities of a high order has recently been announced by the General Electric Co., following tests under service conditions.

The new material, known as Genelite, contains graphite amounting to 40 per cent by volume of the whole mass. Tests have shown a high degree of porosity, the metal being able to absorb as much as 2½ per cent by weight of oil. This characteristic is made use of in high speed applications where oil is applied to the outside of the bushing and carried through to the bearing surface by capillary attraction. Another characteristic, that is claimed, is that the bearing never siezes or freezes, or the metals of the shaft and the bearing never flow or weld together. If a bearing sticks, owing to too close a fit, all that is necessary is to reassemble it with the proper fit, no damage being done to the shaft or bearing.

Among the self-lubricating uses for the new bearing are brake rod bushings clutch centering bushings, throttle control, fan and pump shaft bushings.

Genelite is made from the oxides of tin, lead, and copper, composing a high grade bronze, plus graphite, all the materials being in a finely divided state. Graphite is added in sufficient excess quantity to reduce the oxides to the metals and leave the required graphite content in the finished material.

The material has the general appearance and body of bronze, but the characteristics are different. It does not machine readily by the ordinary methods, but can easily be ground, which has been found to be the best method of handling it in quantity. Neither has it the physical characteristics of bronze, having very low tensile strength, but withstanding high compressive strains.

When considering the relative performance of bearings, care should be taken that all the factors entering would be given due consideration. A self-lubricating bearing should never be compared with a lubricated one, for no bearing will give as good results unlubricated as a similar bearing properly lubricated. But it is sometimes necessary, due to inaccessibility of parts, or neglect on the part of the user, to install bearings that are self-lubricated.

GEORGIA DEALERS CONFER

Macon, May 7—About 125 Buick and Cadillac dealers in the various counties of middle Georgia surrounding Macon were the guests recently of the new Dunlap-Huckabee Co. at a general sales conference and get-together meeting. The company recently moved into its new home here.

Makes of Tires to Handle

Choose Standard Merchandise
Misleading Long Discounts
Price Cutting Spells Failure
Cost of Doing Business
Pick Financially Strong Factory
What About "Seconds?"

THERE are many yawning pitfalls for those who enter the tire business without previous knowledge of its intricacies and various ramifications and they are only thinly veiled. Perhaps the experience of one dealer who has avoided most of the pitfalls and been trapped by some of the others may be of assistance to the newcomer in the trade and of value to others of experience.

As in everything else in life, there are two ways to do it; a right way and a wrong way. You may either choose as your merchandise the product of any one of the standard manufacturers which is sold at a standard, known price, or you may choose a product of an obscure manufacturer whose goods, perforce, are sold at almost any price the dealer can get.

BUILD ON SOUND FOUNDATION

If you choose the product of a reputable manufacturer you will build your business on a sound foundation. The price at which you sell such tires will be known to your customers and to your competitors. The price at which you purchase them will be established and will not vary among other dealers in your city or among dealers in the other cities. Thus no other dealer handling the same line will be able to gain an advantage over you due to his ability to buy at a lower price.

To be allied with one of these big, well-known, well advertised and well-thought-of companies gives your business a tone it is impossible to obtain in any other way. You may be sure that the merchandise is good. You may be sure that your troubles with tires coming back due to unsatisfactory wear will be reduced to a minimum.

HANDLE QUALITY MERCHANDISE

The products of these big companies **must** be right. They have a reputation to sustain. They cannot afford to allow a dealer to distribute merchandise that is untried and that may perhaps develop troubles that will give both the dealer and the manufacturer a black-eye.

Handling the products of any maker who has established a reputation for quality merchandise and fair dealing gives your business a credit standing that would require a far longer time to build up with lesser known merchandise.

Such makers go to almost unlimited ends to assist the dealer. Because of their extended experience they are in a position to offer intelligent advice. Their services are at the beck and call of the dealer and the dealer cannot go wrong in calling on them.

The advice they are in a position to offer may cover anything concerning which the dealer is hazy. It would logically cover the size of stock to carry and very often may cover such important questions as have to do with the financial condition of the dealer and his relations with his local bankers. In this connection the makers' representatives, who are constantly in touch with hundreds of dealers, are in an unusually excellent position to be of real help in untangling knotty problems and setting the dealer's feet in the pathway of progress.

In short, the best way to avoid the first pitfall is to pick an established manufacturer with an established reputation.

MISLEADING LONG DISCOUNTS

Do not be misled by long discounts. Frequently dealers will be approached by traveling salesmen with offers which on the face, and without very deep delving, appear more than ordinarily advantageous.

Scrutinize such offers closely. Never forget that the selling price on a particular size and style of tire is governed more by custom than by the printed price lists of the maker.

Sometimes dealers will be offered a line of tires at discounts ranging from 15-10-10-10-10% to 40-20 and 5%. Such tires invariably carry a list price far higher than the list price of any of the standard makes.

The manufacturer's salesman will say: "Here is a 30x3½ tire that costs you $14.93, it sells for $31.10 and you make $16.17 on it."

But is this so? You know that any of the standard 30x3½ in. fabric tires sells for approximately $20. This means that any 30x3½ in. tire you sell must sell for approximately $20.

PRICES ARE FAIRLY STANDARD

You cannot expect to get $31.10 for a a tire of this size when a customer can get any one of a half dozen standard, well-known makes at a standard price very much lower.

This means, then, that you must cut the price of this favored brand which a very optimistic salesman has offered you.

It means that you are selling an unknown or little-known product—unkown or little-known to both you and your customer—at a price on a par with standard merchandise. It means that you must cut the price of the unknown tire to such an extent that **it will sell on price and on price alone.** In this case your margin of profit is considerably less than in the case of the standard tire.

None of us are so good that we can get along without a profit. We may sell for a little while without any or with insufficient profit but in the end the sheriff will get us.

Don't forget that old man "overhead" is always there to take his toll of the till. After he gets his, the dealer gets what is left—if there is any left. Make sure there is.

We hear a great deal of complaint regarding the small margin of profit al-

Tires from A to Z

The subjects which will be treated thoroughly in this series of articles on Practical Tire Merchandising and Repairing are listed below:

2—Makes of Tires to Handle.
3—Handling the Sales Force.
4—Letters and Post-Cards.
5—Advertising.
6—Window Displays.
7—Salesroom and Office.
8—Service Station Facilities.
9—The Service Station.
10—The Service Car and Its Equipment.
11—The Repair Department.
12—Equipping a Shop.
13—Tube Repairing.
14—Fabric Tire Repair.

lowed by tire manufacturers in general. The trouble does not lie with the manufacturer.

The short discount is directly the result of the foolish practices of the dealer. Time was when the average discount and also the average list were considerably higher than they are today. This brought about price-cutting competition. Dealers gave away part of their profit in a short-sighted attempt to get business. As a direct consequence, thereof, manufacturers reduced both lists and discounts.

They shortened them to the point where a dealer **can no longer afford** to give his customers that 5 or 10 per cent. Despite this fact some dealers deliberately overlook these truths. They are riding for a fall.

WHY PRICE-CUTTING SPELLS FAILURE

No tire dealer can afford to cut prices. The reason is plain to any who have eyes to see. The average dealer's discount on standard products—leaving out of account those tires that are long on list and long on discount, tires that have questionable merit—is approximately 20 per cent.

"Surely," you say, "20 per cent is plenty." But is it? Let us analyze the situation. It has been demonstrated that the average cost of doing business in an average tire salesroom and repairshop is very close to 17 per cent. It is seldom less and may be a little more. However, this is approximately correct.

COST OF DOING BUSINESS

If it costs us 17 per cent to do business and the average net discount is 20 per cent, there is 3 per cent left for us to call our own. This 3 per cent is net, not gross. Is 3 per cent such a remarkable profit to make?

To put it more plainly, suppose we have sales averaging, say, $4,000 a month. This is a total of $48,000 for the year. On this volume of sales the gross profit would be $9,600. Similarly, the cost of doing business would be $8,160, and we should have left at the end of the year a total of $1,440 net profit after having paid all the expenses of the business and a fair salary to ourselves.

That is, we have a net profit of $1,440 providing we have not cut prices. If we cut our prices by 2 per cent, we reduce our net profit by approximately $1,000. If, we cut them 5 per cent, we go in the hole for nearly $1,000.

The moral should be plain: Don't cut prices. Let us forget prices, let us sell our merchandise on merit. Let us sing the praises of the merchandise so long and so loud that the customer will want it regardless of price.

CHOOSE FINANCIALLY STRONG FACTORY

Choose a factory that is financially strong. Thus avoid price-cutting, business-demoralizing tactics that may be instituted, aided and abetted by the manufacturer.

For example, the tire trade is at present witnessing the frantic efforts of a nationally-known maker to get out from under, to liquidate inventories, to get cash, regardless of the hardship it is working on his dealers and blind to the future not only of himself, but of his whole selling organization—the retail dealer.

This maker is selling his standard products direct to the public, at 25 per cent off standard list. In an effort to condone the action, he offers his dealers—also any other dealers, regardless of whether they are his or not—a wholesale list which is 25 per cent below the established preferred dealer list!

Decimal Equivalents of Chain Discounts

Put this where it can be referred to when figuring discounts

Chain Discounts	Total Disc.	Multiplyby
25%=	.25	.75
25%+5%=	.2875	.7125
25%+5%+5%=	.32312	.67688
25%+5%+5%+5%=	.35697	.64303
25%+10%=	.325	.675
25%+10%+10%=	.3925	.6075
25%+10%+5%=	.35875	.64125
25%+10%+5%+5%=	.39081	.60919
25%+10%+5%+5%+5%=	.42127	.57873
20%=	.20	.80
20%+5%=	.24	.76
20%+5%+5%=	.278	.722
20%+5%+5%+5%=	.3141	.6859
20%+10%=	.28	.72
20%+10%+10%=	.352	.648
20%+10%+5%=	.316	.684
20%+10%+5%+5%=	.3502	.6498
20%+10%+5%+5%+5%=	.38269	.61731
15%=	.15	.85
15%+5%=	.1925	.8075
15%+5%+5%=	.23287	.76713
15%+5%+5%+5%=	.27123	.72877
15%+10%=	.235	.765
15%+10%+10%=	.3115	.6885
15%+10%+5%=	.27325	.72675
15%+10%+5%+5%=	.30959	.69041
15%+10+5%+5%+5%=	.34411	.65589
10%=	.10	.90
10%+10%=	.19	.81
10%+5%=	.145	.855
10%+5%+5%=	.18775	.81225
10%+5%+5%+5%=	.22836	.77164
5%=	.05	.95
5%+5%=	.0975	.9025
5%+5%+5%=	.14262	.85738
5%+5%+5%+5%=	.18549	.81451

Fig. 1—Under the heading "Total Discount" will be found the decimal equivalent of any of the various combinations of discounts, and this is the discount to be deducted. To find the net cost of an item, multiply by the decimal equivalent in the last column. For example, if a tire lists at $31.15, and your discount is 20-5-5-5%, then multiply by .6859, which gives $21.37 as the net cost of the tire to you

WHAT ABOUT "SECONDS?"

Picture to yourself the effect such action must have on this maker's unfortunate dealers who are stocked up with tires bought before this infamous 25 per cent-off-the-list-campaign was given to an unsuspecting public.

Now a word with regard to "seconds." No legitimate tire dealer will handle anything but first-quality merchandise. To do otherwise is to court trouble.

A "second" is an imperfect tire. It is defective somewhere. During the process of manufacture someone has made a mistake. The layers of fabric may have been very slightly wrinkled when the builder laid them on; there may have been some slight imperfection in the fabric; the frictioning may not have been up to the required standard; the tire may have been pinched or buckled in the curing mold.

All these defects are carefully watched for by an inspector who examines every operation as each tire is built up. Quite frequently it is cheaper for the tire maker to continue the production of such a slightly imperfect tire and sell it as a "second" rather than scrap it. If scrapped in the half-built condition it would be almost a total loss to the manufacturer. On the other hand if it can be finished and sold as a "second" it will probably bring the maker enough to offset the bare cost of production.

"SECONDS" OF SEVERAL CLASSES

"Seconds" are divided into several classes. There is the "second" that has just been described and which has some hidden defect certain to give trouble sooner or later. Then there are tires that are over-cured in the vulcanizing process, or under-cured.

These "seconds" look perfectly normal to the unpracticed eye, may even deceive an expert unless certain tests are ap-

(*Continued on page 53.*)

EDITORIAL

Instructing the Car Owner

WE recently had occasion to look over the calls for service extended to members of the Chicago Motor Club and a tabulation of the calls showed that by far the largest number were occasioned by members who were stalled with ignition trouble of some kind. It is to be expected, of course, that a driver stranded with electrical difficulties is very apt to call for assistance, because he knows least about this part of his car. The difficulty is not due to any glaring faults in the electric systems as provided by manufacturers.

The systems used on our modern cars are in the main excellent outfits and function best, of course, in the hands of an experienced driver. The trouble is that most drivers are not experienced. They have not been taught properly to read their instruments, nor are they versed in the elementary principles of motor car ignition and lighting.

The dealer's service station can do a great deal of good in the way of educating car owners in properly caring for the electric system. How many owners know, for instance, that many times an engine that will not start owing to a run down battery can be made to do so if the coil wire is connected in such a way that the resistance is cut out and what little current there is in the battery used to good advantage? Every car owner cannot be made an expert electrician, but he ought to know how to make certain adjustments that will get him home when stranded. Some service managers conduct a class one night a week for car owners and the idea could well be taken up by many others.

Service Association Advantages

DEALERS have been able to accomplish a great deal for their branch of the industry through association work, evidence of which is cropping out daily. And what is true of dealer organizations is equally true of service associations. The dealer has a broader field in which to work, perhaps, for many of the problems that come before him touch more or less the men who look after the servicing of his cars. But there are questions to be regarded purely from a service standpoint which are properly in the field of service associations. There are new angles to his work to be obtained, new viewpoints that will enable the serviceman to perform more efficiently and these can be obtained through an exchange of ideas.

Service associations offer a medium for such exchange. Problems that confront one service manager in all likelihood confront another and two minds always work better than one. Service methods can be improved by servicemen getting together and going over their individual problems, threshing them out, finding the best way to deal with them and listening to speakers who through their long experience have come to be experts in their line. Men understand each other better when they can get together; they forget petty jealousies and begin to realize that in their joint efforts they are cooperating to attain a common objective. The chief motive behind all such organizations is improvement of the work in which the members are engaged.

Memory Trees on Highways

PRESIDENT HARDING has endorsed the movement for soldier memorial tree planting along the highways of the country. Many highway officials and highway associations in general have expressed themselves as favorably inclined towards the proposition. It is the thought of MOTOR AGE that much good could be accomplished if the automotive dealers, distributors and others engaged in the industry would get behind the movement.

The men in the automotive industry represent a powerful institution and their efforts coupled with those of highway officials, motor clubs, and similar organizations certainly would give the movement enough stimulus that we could expect to see the results in a very short time. A general adoption of the idea would, in the future, be noted as one of the beautiful and useful ideas our soldiers brought back from France.

Consider Everything

THE touring season soon starts, which means that the dealer who is planning to cash in on the demands of the tourist trade is already thinking ways and means to make the season successful. One of the difficulties in preparing for the tourist trade is that the whole project is an anticipatory one, by which we mean that the demands of the motorist must be foreseen and adequate steps taken to supply his wants.

In the way of stocking up with seasonable accessories we recommend that everything which you yourself as a dealer might ever want were you touring the country be considered as suggestive material for your shelves. While cigars are not ordinarily considered an accessory, we recall how one dealer who was making a trip found it necessary to stop in at a service station for a few minor repairs to his car. While he was waiting and fretting over the delay, his temperature mounting and his good disposition leaving at a rapid rate, the feeling came to him that he wanted a smoke—that a smoke was the only thing that could quiet his nerves. At the moment when this wish seized him he noticed standing in a corner of the service station a small cigar case containing a few choice brands of Havanas. A few puffs and his old good disposition returned and the fretfulness left him.

That is just an incident but it shows what a dealer can do in the way of making things pleasant for the motorist and profitable for himself.

Car Dealers in New York Able to Keep Track of Competitors

Monthly Compilation of Sales by Private Company Made Available to Subscribers

NEW YORK, May 6—Passenger car dealers in the metropolitan area have been afforded their first opportunity of obtaining prompt information regarding sales by their competitors. A private company has undertaken monthly compilation of car registration figures at the office of the Secretary of State, and is furnishing reports to dealers subscribing for its service at a fixed sum per month. The reports contain not only the total registration on new cars of each make, during the month, but also the names and addresses of the registrants.

Hitherto dealers have had to rely on lists prepared periodically by various companies, some of them appearing two or three times a year, and others only once a year. These lists gave the names and addresses of car registrants, but in many cases the information was received so late that it was of little value to subscribers to these services. The plan of the company handling the monthly lists gives dealers and sales managers an almost immediate check on the successes or failures of their competitors.

The service which has been subscribed for by a good many New York, Brooklyn and vicinity dealers, is being closely watched by sales managers and has revealed some interesting information regarding cars running in the high, medium and low classes as far as sales are concerned. It confirms the general understanding that Ford, Studebaker, Buick and Dodge were running high. Equally interesting, but in a considerable measure surprising is the information that a number of lines have sold only one, two, three, four and five cars since the first of January.

The fact that the service gives the names and addresses of car registrants, or in other words, new car purchasers enables dealers to note where their competitors' selling activities are finding readiest response. A study of the service has already resulted in minor changes in the selling plans of several dealer organizations.

Charles F. U. Kelly Is Now Connected With Quaker Tires

Philadelphia, May 6—At a meeting of the directors held last week at the office of the Quaker City Rubber Co., Charles F. U. Kelly was elected director of sales of the tire division of the above company which also manufactures a full line of mechanical rubber goods.

Mr. Kelly has been engaged in directing tire sales practically all his life. He began selling tires to the bicycle industry in 1893 and, with the exception of a much needed rest during the past year, has been continuously engaged in tire selling. His experience is far reaching, having been associated in the past with such concerns as Goodrich, Pennsylvania, Racine, Continental and Lee.

Sales offices have been opened at 1664 Broadway, New York, under the name of The Quaker City Rubber Co., Tire Sales Division, from which address Mr. Kelly will conduct the selling campaign.

A. H. Thomas, formerly associated with Mr. Kelly, has again returned to his old employer and will assist in the promotion and sale of the Quaker City tire products.

Chain of Tire Stores Object of Newly Organized Company

Philadelphia, May 6—The Universal Tire Co. has been organized under the laws of the state of Delaware with a capitalization of $7,500,000 for the distribution of tire merchandise through the New England states. The company is opening up ten stores in Pennsylvania, Maryland and Delaware with the supply for this territory being received from its warehouse in Philadelphia.

It is the intention of the company to acquire through stock-ownership control of factories manufacturing automobile tires and tubes to supply the demands of the various stores. The first manufacturing unit will be the International India Rubber Corp. at South Bend, Ind., whose president, George W. Odell, is also president of the Universal company. The corporation is now working 24 hours daily turning out Odell cord and South Bend fabric tires and tubes and has announced a price reduction of 20 per cent from the Nov. 1, 1920, price list of those products.

Marmon Officers Directing New York Distributorship

New York, May 7—Under a new operating arrangement just worked out, The Marmon Automobile Co. of New York, distributor of the Marmon in the Metropolitan territory, will come under the direction of the officers of the Nordyke & Marmon Co. A. R. Heiskel, treasurer of the Nordyke & Marmon Co., has been elected president of the New York corporation and S. S. Toback and Frank Carrie, vice-presidents. Toback, until he retired from the New York organization several months ago to do some special work for the factory, was general sales manager. Carrie has been vice-president of the local company for some time.

The change in plan does not make the Marmon representation in New York a factory branch. The company remains a separate entity.

GENERAL TRACTORS BANKRUPT

Madison, Wis., May 6—General Tractors, Inc., a Delaware corporation with plants at Watertown, Wis., Bramford, Ontario and Paulsboro, N. J., manufacturing the Monarch Creeper type tractors, has been adjudicated a bankrupt. The referee is C. F. Lamb of this city. The last balance sheet of the company showed assets slightly in excess of $2,000,000.

Depression No Hindrance to Shattering of 1920 Records

"Facts and Figures" of N. A. C. C. Show Business Aggregate $3,594,814,620

NEW YORK, May 6—All records for the automotive industry were shattered in 1920. The remarkable showing made last year, notwithstanding the serious depression which came in the later months, is shown by statistics contained in the 1921 edition of "Facts and Figures" issued by the National Automobile Chamber of Commerce.

The total wholesale business in motor vehicles, parts, tires and accessories in 1920 amounted to $3,594,814,620. This included car and truck sales of $2,232,927,678, parts and accessories of more than $725,000,000 and tire replacement business of $636,750,000.

Many pages of the pamphlet are devoted to research supporting the statement of President Harding that "the motor car has become an indispensable instrument in our political, social and industrial life." It is shown that 3,000,000 motor vehicles are used by farmers, 100,000 by doctors, 30,000 by state government, 10,000 by municipalities, 12,000 by rural schools, 4,000 by packing companies, several thousand by the post office department and thousands more in various lines of commercial and industrial activity.

Export Business Increases

Exports formed a larger part in the automobile business than ever before with 1920 having 7½ per cent of the total output as compared with 4 per cent the year before. The total number of motor vehicles exported was 170,765 or more than double the 1919 figure of 82,652. The United Kingdom, British India, Canada and Cuba were the largest buyers.

The automobile todays pays more special taxes than any other industry. Total levies upon the automobile in 1920 exceeded $316,720,000. More than $148,000,000 of this was in Federal taxes.

Enclosed bodies formed 17 per cent of the passenger car production of the year as compared with 10 per cent in 1919.

Automobile registration in the United States in 1920 totaled 9,211,295 or 22 per cent more than 1919, according to the N. A. C. C. figures. Approximately 990,000 of these vehicles were motor trucks. South Dakota now has one automobile for every five persons, Iowa one for every five and a half and Nebraska one for every 5.9.

Remarkable gains were made in the fuel supply during the year. Although threatened with a shortage in the spring, production was increased to a point where it reached 4,882,546,699 gallons of gasoline for the year, an excess of 626,118,674 gallons over the demand.

Invite All Branches of Trade to Michigan Dealers' Meeting

Program Includes Talks on Service, Selling, Associations, Finance and Legislation

ST. LOUIS, May 6—Dealers in all branches of the trade—passenger cars, trucks, accessories—and proprietors of garages in every part of Michigan have been invited by Harry G. Moock, secretary-manager of the N. A. D. A., under whose auspices it will be held, to the first annual convention of the Michigan Automotive Trade Association which will be held at the Statler hotel, Detroit, May 10 and 11 and which promises to be one of the largest gatherings of automotive dealers ever held in the history of dealer organizations.

The program for the two days is as follows:

Tuesday, May 10

9:30 Statler Hotel—Registration

10:30 Meeting Called to Order—G. S. Garber, state vice president of the N. A. D. A. and president of the Saginaw Automobile Dealers' Association, who will act as chairman of the convention

Address of Welcome—Thomas Read, lieutenant-governor of Michigan

Response—G. S. Garber

Appointment of Committees

Address—"Associations," Harry G. Moock

Luncheon—Stay Where You Are

Address—"Selling Service Intelligently," P. E. Chamberlain

Report of Committees

Constitution and By-laws

Membership and Finance

Address—"Salesmanship and Automotive Merchandising," Wayne Hearne

6:30 Eat, Drink and Laugh, Guests of Detroit Automobile Dealers' Association, Statler Hotel

Short Address by National Leaders

Jesse A. Smith, president, N. A. D. A.

F. W. A. Vesper, former president, N. A. D. A.

Wednesday, May 11

9:30 Report of Committee on Nominations

Election of Officers

10:00 Address—"Automobile Legislation," Harry Meixell, New York, secretary, Motor Vehicle Conference Committee

11:00 Address—"Fundamentals of Automobile Dealer Financing," S. S. Strattan, president, Commercial Acceptance Trust, Chicago

Report of Committee—Resolutions

12:00 Luncheon

1:00 Forum—Tell Your Troubles and Learn from Others

Passenger Car—R. E. Becker, Grand Rapids, leader. Used Car—Service—Sales

Trucks—H. R. Graham, Detroit, leader. Trade-in—Overhauling—Service.

Accessories—E. F. Patterson, Kalamazoo, leader. Display—Advertising — Selling and Service.

Many dealers throughout the country whose factories are located in Detroit are planning trips to the city as guests of the Michigan dealers to avail themselves of the opportunity to take part in these discussions. A meeting of the board of directors of the N. A. D. A. will be held the day previous to the opening of the convention.

Hart-Parr 20 Reduced $200; Financing Plan Is Extended

Charles City, Ia., May 6—The Hart-Parr Co, has reduced the price of its Hart-Parr "20" Tractor $200, from $1,195 to $995 factory cash list. In addition to the reduction the company has improved and extended the scope of its sales financing plan so that it now completely solves the dealer's financing problem and creates a strong working harmony between the factory, the dealer and the dealer's bank.

The factory, which is operating on a limited production schedule to meet only the actual demand so that it will not pile up an inventory, is gradually increasing production of the "20" and shipments are moving steadily forward to the field. The steel foundry opened last week and the company looks for continued improvement during the summer.

A meeting of all the Hart-Parr divisional sales representatives from the United States and Canada was held at the factory here the first of the month. It was the opinion from all parts of the country that the trough of the business depression was passing and that bright spots in sales were appearing where dealers were actually canvassing for sales in a systematic way. Plans were laid for an immediate intensive sales drive.

RELIABILITY TEST FOR SPYKER

Amsterdam, April 19—Baron W. van Weeds of Amerongen, Holland, has challenged the Spyker Works to undertage a reliability test of from 20,000 to 30,000 kilometers over the most difficult roads of Europe, between Haparanda, Sweden, and Gibraltar, Spain, and from Brindisi to Glasgow. The challenge has been accepted and shortly a 6 cylinder, 30-40 horsepower Spyker car will be ready to start on the trial. This car, of standard model, will be in all parts identical to the car that recently covered a distance of 30,000 kilometers (18,630 miles) in an uninterrupted run. The Royal Netherlands Automobile Club will be requested to seal up the car in all parts and will, furthermore, control the entire test.

NEW YORK RATES LOWERED

New York, May 6—The Federal Reserve Bank of New York has announced a reduction in its rediscount rate on commercial paper from 7 per cent to 6½ per cent. The rate has been stationary at 7 per cent since June 1, 1920. The reduction was justified by the large increase recently in reserves.

Pay-as-You-Go Plan and Not Issue of Bonds for Louisiana

Despite Dealer Protest Industry Will Probably Shoulder Burden of Taxation for Roads

NEW ORLEANS, May 6—Automobile dealers and distributors of New Orleans are paying out considerable money, devoting much time, and doing a great deal of traveling through the state in an effort to bring to success the campaign for good roads now before the constitutional convention at Baton Rouge. Realizing that the main factor which is holding back the return of the automobile industry to normal conditions in Louisiana is the inability of the motorist to travel more than 20 miles over a passable road in any one direction, the dealers have undertaken an extensive advertising campaign to induce the 146 members of the constitutional convention to abandon their political jockeying and get down to business on the road-building and maintenance program.

This is the heaviest and most expensive campaign the automobile dealers of Louisiana ever have undertaken. The dealers are confronted with another menace in the "pay-as-you-go" plan of road financing, introduced by a delegate from one of the agricultural parishes, where the farmers want the good roads, but also want the motorist and the automobile dealer to pay for them, instead of allowing the entire state, including the motorists, dealers and farmers, all of whom are benefited equally by the better highways, to pay for them through a bond issue.

Indications are that the pay-as-you-go plan, including increased automobile taxes, and a tax of two cents a gallon on gasoline, will go through, as the bond issue plan is in disfavor with the committee on roads and drainage. Dealers estimate that, if this pay-as-you-go tax burden is put on the automotive industry here, it will reduce sales of passenger cars, trucks and tractors at least 35 per cent below normal, in spite of the building of the good roads, and even though conditions otherwise return to normal.

BUSINESS BETTER THAN YEAR AGO

Baltimore, May 6—The No-Leak-O Piston Ring Co., which despite the slackness during the fall, continued production at a normal rate states that the sales of the piston ring for the first three months of 1921 show an increase of more than 75 per cent over the same period in 1920.

St. Louis, May 6—The Moon Motor Co. reports that its domestic business for the first four months of this year is 27 per cent greater than for the same period last year. While the export business is practically gone temporarily, nevertheless, the total gross sales for the four months are greater than last year's corresponding period.

New Collins Car Ready for Public Showing in January

Organization to be Headed by Former Cadillac President; Not Durant Subsidiary

NEW YORK, May 6—The following statement in reference to the future plans of R. H. Collins, whose resignation as president and general manager of the Cadillac Motor Car Co. was accepted last week, has been authorized.

"The Collins Motor Car Co., a Michigan corporation with a capital of $10,000,000, is being organized to manufacture a high grade car bearing the name Collins. The car will be ready for the inspection of the public Jan. 1, next. Collins, with a few of his former associates and personal friends, will control the company. The plant will be located in Detroit."

This statement, prepared in the New York headquarters of W. C. Durant, shows that there has been a sudden change in the original plans under which Collins was to head the Michigan subsidiary of Durant Motors, Inc., which was to be known as the Durant-Collins Co. There will be a Durant Michigan company but it will produce the Durant four cylinder car. The original plan called for the production of a high grade car to be known as the Collins and this part of the program has not been abandoned, although the car will be made by an independent company. Durant will be a large stockholder in the Collins company.

While Durant will be intimately associated with Collins in the new company, the corporation will not be, strictly speaking, a subsidiary of Durant Motors, although the business relationship between the two is expected to be close. No details of the corporation's plans are available beyond those contained in the statement. This would indicate that there is no basis for the report from Cleveland that the company would locate a plant in that city.

It is understood that the Cleveland story, printed under scare heads in the newspapers of that city, was given publicity under a prearranged plan whereby it was to be printed as soon as acceptance of Collins' resignation from the General Motors Corp. was announced. This was done without consideration of possible changes in the plans.

Will Sell Less Than $1000

The program as it was understood in Cleveland, called for the location there of a large factory by the Durant-Collins Motor Corp. According to the Cleveland story the car which it was proposed to manufacture there would sell in the popular price class.

No details in regard to the Durant car have been made public but it has been announced it would sell for less than $1,000 and several officers prominent in the Chevrolet company have joined the Durant organization. The latest to go with him was M. J. Lahey, who has retired as sales manager of the Chevrolet Motor Co. of New York to become sales manager of the Durant Motors Co. of New York, which recently acquired the Goodyear plant in Long Island City. Lahey's successor has not been appointed by the Chevrolet company.

Central Wisconsin Ready for Annual Automotive Exposition

Second Largest Show in State to Be Conducted by Madison Dealers

MADISON, May 9—The largest motor show in Wisconsin, save that in Milwaukee, opens here tomorrow, it being the second annual Central Wisconsin Automotive Exposition conducted by the Madison Automotive Dealers' Association. The mammoth plant created during the war period by the Four Lakes Ordnance Co. will be used as last year.

While the Madison dealers have held a local show for eight or nine years, it was not until a year ago that the capital city exposition took real rank with the important shows of the Northwest. Paid admissions in 1920 totaled 23,575, and the total attendance was nearly 30,000. This year, for a week, special emissaries toured counties surrounding Madison to interest farmers and to actually sell tickets to them. The fact that the Wisconsin Legislature is in biennial session also adds unusual interest this year from an attendance standpoint.

The show will last four days, each of which has been designated as a special event. Opening day will be "Watertown, Jefferson and Fort Atkinson Day." May 11 will be set aside especially for residents of Portage, Baraboo, Beaver Dam and Sauk City; May 12 for Beloit, Janesville, Edgerton and Stoughton; May 13 for Platteville, Boscobel, Dodgeville, Monroe, Richland Center and Mt. Horeb; May 14, the final day, being Madison Day.

Greatest List of Entries for Indianapolis Race

Best Showing of Entrants Ever Made for Annual Championship Event on Speedway, May 30

INDIANAPOLIS, May 5—Twenty-five cars, representing England, France and America, have been entered in the International 500-mile race to be held at the Indianapolis Motor Speedway, Monday, May 30, for a purse approximating $100,000. The closing date for filing was May 2. The names of all but two of the drivers have been announced.

Six of the drivers have never competed in an event at Indianapolis but all of them have established records on road courses or other speedways. The Italian flag will fly over the garage of De Palma and Resta, both having been born in Italy, while the tricolor of France will wave over the French colony composed of Andre Boillot, Rene Thomas, Albert Guyot, Jean Chassagne and their large corps of assistants. Foreign cars entered in the race as Sunbeams, English; Peugeot, Talbot-Darracq and Ballot, French; with the other cars all made in America. In the race there will be five strong teams composed of two more cars with at least four lone wolves, prominent among them, Ralph De Palma.

The advance seat sale indicates that the crowd of more than 125,000 which witnessed the race last year will be surpassed.

Entrant	Car	Driver
E. A. Hearne	ReVere Special	Eddie Hearne
Ralph De Palma	Ballot Special	Ralph De Palma
Ira Vail	Leach Special	Ira Vail
Tommy Milton	Durant Special	Tommy Milton
Duesenberg Brothers	Duesenberg Special	James Murphy
Duesenberg Brothers	Duesenberg Special	Roscoe Sarles
Duesenberg Brothers	Duesenberg Special	Edw. Miller
Duesenberg Brothers	Duesenberg Special	Eddie Pullen
Louis Chevrolet	Frontenac Special	Ralph Mulford
Louis Chevrolet	Frontenac Special	.....
Jules Goux	Peugeot Special	Howard Wilcox
Louis Coatalen	Talbot-Darracq Special	Andre Boillot
Louis Coatalen	Sunbeam Special	Rene Thomas
Louis Coatalen	Sunbeam Special	Dario Resta
C. L. Richards	Junior Special	R. J. Brett
C. L. Richards	Junior Special	.....
Jean Chassagne	Peugeot Special	Jean Chassagne
John A. Thiele	Duesenberg Special	John A. Thiele
Jules Ellingboe	Frontenac	Jules Ellingboe
Stanley Kandul	Chicago-Frontanec Special	Percy Ford
Duesenberg Brothers	Duesenberg Special	Joe Boyer
Duesenberg Brothers	Duesenberg Special	Albert Guyot
C. W. Van Ranst	Frontenac Special	C. W. Van Ranst
L. L. Corum	Frontenac Special	L. L. Corum
Mervin E. Headley	Frontenac Special	M. E. Headley

Department of Labor Shows Better Conditions Prevail

Financial Agency Evidences in Report That Purchasing Power of Nation Not Curtailed

CLEVELAND, May 6—The automobile industry continued through April to set the pace for all other producers in the matter of business increase. Employment figures compiled by the industrial relation committee of the Chamber of Commerce for the United States Department of Labor gives an accurate account of the forward march of the automotive industry. These figures show that on April 30 there were 22.8 per cent more employees working in automobile factories than were on the payrolls March 31 on which date there were 24.1 per cent more men employed than on Feb. 28.

Eighteen concerns, including several automobile parts and accessory manufacturers, reported to the chamber that the number of employees on the rolls was 9948 as compared to 8103 on March 31.

Figures on other industries for April 30 show that there is a general improvement.

Report Reflects Labor Trouble

In the metals and metal products other than steel and iron the increase in employment on April 30 was 13.1 per cent while on March 31 the report showed 19.1 per cent less than on Feb. 28.

Labor trouble in the building trades is reflected in the report which shows the number of employees in that industry is 33.4 per cent less on April 30 than on March 31. There was a decline on April 30 of .4 per cent of the number of employees engaged in making food and kindred products; a loss of 2 per cent in iron and steel and their products; gain of 5.4 per cent in textiles and their products; gain of 1.8 per cent in paper and printing; gain of 4.7 per cent in chemicals and allied products and a loss of 2.4 per cent in miscellaneous products.

New York, May 6—Additional evidence that the purchasing power of the United States has not been curtailed to such an extent as was supposed is found in the fact that total purchases of merchandise in February last averaged 77 per cent of the purchases for February 1920 which probably was the largest February the merchants of the country ever had.

Some States Show Gain

Statistics compiled by Roger Babson show that in the states of Arizona, Maine and Oklahoma the purchases in February 1920 equaled or exceeded those in the same month the preceding year. States in which the percentage was 90 or over, were: Arkansas, California, Maryland, New Jersey, New Mexico, Pennsylvania and Texas.

States in which the percentage was more than 80 but less than 90 were: Connecticut, Delaware, Florida, Illinois, Indiana, Iowa, Louisiana, Mississippi, Nevada, New York, North Carolina, Ohio, Oregon, Utah, Virginia and Wisconsin.

States who had the lowest percentage were: Colorado 63, Georgia 63, Idaho 64, Kansas 68, Tennessee 63, South Carolina 58 and Washington 65.

Automotive Equipment Trade Not Keeping Up Earlier Pace

Chicago, May 5—The rate of improvement in the automobile equipment business is not keeping up to the pace set earlier in the year is the opinion of George Fritz, general manager of the Research Club, Inc.

"Conditions are improving" he says, "but on a very conservative basis. The east is in better shape than any territory, then comes the middle west with the Pacific coast district following and then the northwestern territory with the south last. Most buyers are still looking for a further decline in prices."

Mr. Fritz finds that this anticipated reduction and the slow movement of stocks are the principal factors in the slowing up of business which reached its high mark of the year in March. He feels also that 1921 will toll the death knell of a number of houses which have not been conducting their business on a conservative basis unless these houses in the meantime get down to "brass tacks," adopt methods of retrenchment and place their business on a sound business foundation.

Willys-Overland Greatest Driveaway Takes Out 525 Cars

Toledo, May 5—Following the greatest driveaways of motor cars in the history of the Willys-Overland Co. at Toledo and a meeting of 600 dealers and bankers in five neighboring states with factory officials, John Willys announced that the company was planning to increase its working force by 30 per cent in May and its production by 50 per cent.

There are now approximately 6,500 men at work at the Toledo plant producing about 300 cars a day. The force will be increased to nearly 9,000 next month.

A. C. Barber, sales manager, states that the sales incident to the driveaway in which 525 cars went out had brought in $545,180 in cash to the treasurer's office during the week.

TRACTOR CLUB NAMES OFFICERS

Kansas City, May 5—At the annual election of the Kansas City Tractor Club, the following officers were elected for the ensuing year: G. T. O'Malley, Fordson distributor, president; F. H. Turner, B. F. Avery & Sons Plow Works, vice-president; Guy H. Hall, secretary-treasurer. Directors: E. J. Anderson, Avery Co.; Edwin Downs, Rock Island Implement Co.; R. W. Johnson, International Harvester Co.; W. E. Manning, Samson Tractor Co.; R. R. Powers, Aultman-Taylor Mchy. Co.

New Company to Make Scott Steam Motor Truck and Car

Standard Engineering Company Turns Over Assets to St. Louis Manufacturing Organization

ST. LOUIS, May 6—A manufacturing corporation to produce in St. Louis the steam vehicle designed during the past three years under the auspices of the Standard Engineering Co. has been formed under the name the Standard Steam Corp., temporarily occupying the premises previously maintained by the engineering company here. A steam motor truck is added to the passenger car which was the first product designed by the company. All the assets of the company are taken over by the newly formed organization.

A number of prominent St. Louisans are interested in the corporation. The officers are: W. J. Parrish, formerly the Packard distributor in this city, president; Charles A. Lemp and L. L. Scott, vice-presidents; A. J. Lindsay, secretary and treasurer. The other directors are: Charles L. Holman, R. L. Hedges, and J. L. Johnston.

Steam Car Has New Features

The chief interest centers in the steam motor truck which the corporation plans to produce, in view of the fact that it will be the first concern to manufacture this type of vehicle. L. L. Scott is designer of both the passenger car and the truck and has embodied many new principles in the new engine.

"The points brought out by recent tests," Scott says, "are high fuel mileage on kerosene or fuel oil, rapid acceleration, and low upkeep cost because of the elimination of clutch and gear box.

"Starting and stopping of passenger buses that make a thousand stops a day is destructive to a heavy bus that uses the gasoline power plant.

"Pneumatic tires are coming into general use on trucks up to three tons. To take full advantage of the pneumatic tire the truck should be capable of running from twenty-five to thirty miles per hour. This speed calls for a great many changes in the modern gasoline truck and the rear axle gear ratio must be around 5 to 1 in order to keep the engine speed down. A change in the rear axle gear ratio calls for a different transmission.

"The steam truck uses no transmission, has a 5 to 1 rear axle ratio, and can run thirty miles per hour or even faster. It is designed to carry two tons but we have loaded three and a half tons and had no trouble in negotiating a 15 per cent grade.

"Acceleration tests show that it would accelerate from 150 to 400 per cent faster than their buses using gasoline power plants. We can reach 15 miles an hour from a stop in three seconds."

Nine Competitors in Corsican Grand Prix Race—Guyot Wins

Cars Have Four Passenger Bodies of Given Dimensions and Touring Equipment

BY W. F. BRADLEY
European Correspondent of Motor Age

PARIS, April 23—Albert Guyot, driving a special 183 cu. in. Bignan-Sport, won the Corsican Grand Prix race yesterday, covering the distance of 274½ miles in 6 hours 7 min. 51 2/5 sec., or at an average of 45 miles an hour. This race was the first ever held on the island of Corsica, and was limited to cars having a piston displacement of not more than 183 cu. in., with four passenger bodies of given dimensions, with fenders, windscreen, and touring equipment. A cash prize of $20,000 was given to the winner.

Only nine cars were entered in the 183 cu. in. class, these being 2 Bignan-Sport, 4 Turcat Mery, and 3 Chenard-Walcker. Three laps of a most difficult and varied course had to be covered, the road varying from a 30 mile dead level stretch by the side of the sea to a wild climb over the mountains where the rough surface made fast going impossible.

Winner Specially Designed for Race

Guyot took the lead on the first lap, and held it throughout the race. During the initial lap he was closely followed by his team-mate Nougue, but this car dropped out on the second lap, and the running was taken up by Dauvergne on a Chenard-Walcker, and then by Rougier on a Turcat-Mery, who finished second, 35 minutes behind the winner.

The victory of the Bignan-Sport did not cause any surprise, for this car was undoubtedly several miles an hour faster than any of the others, and had been specially designed to fit the rules and to be used on this particular course. The car is the product of Engineer Causan, a specialist in high speed engines.

It has four block cylinders of 87 by 123 mm. bore and stroke, with four overhead valves per cylinder driven by a single camshaft. The engine has a three plain bearing crankshaft with forced lubrication from an oil supply maintained in the chassis, the crankcase being dry. Causan adopted double Delco ignition in preference to magneto. The power obtained is 90 at 3,200 revolutions, and 95 at 3,400 revolutions. Owing to the special nature of the course, the direct drive was on the third, the fourth being geared up for the only fast portion of the route, a 30 mile straightaway by the side of the sea. Perrot front wheel brakes were used, but as these are not manufactured for the stock Bignan cars, Delage parts were used in many cases. In order to get quicker action on the corners, Guyot had independent control of front and rear wheel brakes.

The Chenard-Walcker cars had a special overhead valve 183 cu. in. engine, but the chassis was not so well prepared for the particular conditions of this race as the Bignan-Sport. The Turcat-Mery cars had a special Ballot L-head engine, with inclined valves. It is interesting to note that all the cars in this race had Perrot front wheel brakes. These were insisted on by the drivers, although in no case a part of the standard equipment of the firms entered in the race. Lagache, the head of the Chenard-Walcker team, is a dealer for this firm, and he put on front wheel brakes on his own responsibility, and at his own expense. The same was done by Rougier, the head of the Turcat-Mery team. Many French dealers are now modifying cars received from the factory by fitting front wheel brakes after taking delivery. Clients show a willingness to pay extra for this fitment.

Cause of Accident Not Known

In addition to the 183 cu. in. class, the Corsican event provided classes for 85 cu. in. racers, and for touring cars. There was only one starter in each: Inghibert on a touring model Bignan, and Delaunay on an 85 cu. in. Bignan racer which he had just bought. On the first lap of the race this car turned over, killing the driver Delaunay and his mechanician Godart. As the accident happened on a deserted portion of the road, away from all spectators, it has been impossible to accurately determine the cause. Results of the race:

	h.	m.	s.	c.
1. Albert Guyot (Gignan-Sport) (441 k. 900)	6	07	51	2/5
2. Rougier (Turcat-Mery)	6	42	38	1/5
3. Repusseau (Turcat-Mery)	6	46	40	1/5
4. Daucergne (Chenard-Walcker)	6	52	23	3/5
5. Du Barry (Turcat-Mery)	6	54	07	4/5
6. D'Avaray (Turcat-Mery)	7	10	00	1/5

Sales Organization Is Being Developed by Standard Truck

Detroit, May 5—Standard Motor Truck Co., of Detroit, rapidly is forming a sales organization covering not only the United States but the foreign countries.

H. Y. Stebbins, formerly with the American Polish Relief Expedition organizing and developing motor transport work in Poland, and who had charge of motor transport schools in France, has been assigned to the California and southwestern territory. He will divide his time between Los Angeles and San Francisco. Business in the northwest will be looked after by Artie King, who for some time has been selling Standard trucks in Oregon. His territory now will include Washington and Idaho. His headquarters are in Portland.

C. A. Mayne, who has spent several years developing the automotive trade in Mexico and Central America, is looking after the company's interests in Mexico. R. G. Enell, formerly connected with the Federal organization, now is representing Standard in the southeastern territory, where he is particularly conversant with conditions. C. R. Evans, who has spent 25 years in the merchandising field in Oklahoma, will represent the company in that state.

Reports From Indianapolis Plants Show Greater Output

Stockholders of William Small Co. Furnish Additional Capital for Refinancing

INDIANAPOLIS, May 6—In virtually every automobile factory here production has been increased. It is not by any means what it was last year, but the tendency is for more production.

Leo N. Burnett, of the Lafayette Motors Co., states that his company is about seven weeks behind with deliveries. At the present time the schedule calls for five cars a day, but the plant is working to increase this to ten.

The production schedule of the Cole Motor Car Co. is set at ten cars a day. According to C. A. Snyder of the company, there has been a slight slump in demand noticed during the past ten days, but this is considered only temporary.

Officials of the Robert H. Hassler, Inc., manufacturer of shock absorbers for small cars, state that their plant will continue to work overtime during May as it has been doing for the past month.

The Nordyke & Marmon Co. is working on a production schedule of twelve cars a day. This schedule to be increased according to demand.

H. E. Doty, new sales manager for the Premier, states that cars are being moved out of the factory and out of storage with a regularity that is gratifying. Most of the attention of the officials of the company is being centered on the distribution and sales departments. Production is to be held up in some degree until these other departments are functioning 100 per cent.

Stockholders of the William Small Co. at a meeting recently decided to put $200,000 additional into the company on notes, one, two and three years, the notes to bear no interest. This sum is expected to put the company on its financial feet and enable the payment of all present creditors. The number of directors was increased from five to eleven and include William P. Small, Walter G. Todd, John Rau, Elmer E. Stout, J. F. C. Martin, E. L. Jacoby, T. A. Tavelle, D. L. Fryer, Carl Rost, W. A. Moore and D. H. Lockwood.

According to Randolph Mitchell, assistant secretary of the Kokomo Rubber Co., the record production for one day since the recent resumption of operation was 998 tires, while each day during the past week averaged 950 tires, and they expect soon to produce 1,000 tires a day. Factory work has been somewhat retarded because of the delay in the shipment of materials, but Mr. Mitchell stated this condition has in the last few days shown much improvement.

920 FRANKLIN CARS IN MAY

Syracuse, May 6—The Franklin Automobile Co. of this city reports that on April 28 orders were on hand for 885 cars for May delivery. Production for May will aggregate 920 cars or 40 cars daily.

Dealer Selling Helps Is Plan of Eastern Equipment Jobbers

Garagement Along Seaboard Will Also be Reached in Association's Merchandising Effort

NEW YORK, May 6—The Eastern Automobile Equipment Association, composed of jobbers in the states along the Atlantic seaboard lying between the District of Columbia and Maine, has decided to undertake a circularization of dealers and garagemen, intended to assist retailers in the merchandising of automotive equipment.

At a meeting to be held in the near future, a special committee of the association will get up a series of dealer selling helps which will be sent out to the trade generally in the eastern district. The jobbers felt that such an effort would supplement the activities of the manufacturers in pointing out to the retailers aggressive methods of interesting the public in various articles of automotive equipment.

Advocates Dealer Helps

The dealers listened to a discussion of dealer help activities by Robert A. Stranahan, president of the Automotive Equipment Association and head of the Champion Spark Plug Co. Stranahan outlined some of the efforts of Champion along this line and generally endorsed the idea of dealer helps.

Alfred C. Reeves, general manager of the National Automobile Chamber of Commerce, told of recent conferences with President Harding and other government officials in which the administration showed plainly its desire to cooperate with business. Reeves classed the railroad problem as one of the most important in bringing business conditions back to normal and said that while there has been a decided improvement in passenger cars, accessories and tire business, truck business is still poor and will be for some time, certainly as long as 543,000 idle freight cars are standing in railroad yards throughout the country. Reeves told the jobbers that they should not look for much immediate business in selling equipment for trucks.

Business About 69 Per Cent of 1920

Speaking of passenger car conditions, Reeves said that the demand for cars was good in the east and west and in that part of the middle west east of the Mississippi River and north of the Ohio. In the remaining sections of the country passenger car business, he stated, was slow. Reeves said it was the opinion of directors of the Chamber that the year's production and sale of passenger cars would be probably 60 per cent of 1920.

The association declined to accept the resignation of George B. Shearer, president of Gaul, Derr & Shearer Co. of Philadelphia as president of the association. Shearer, who is in the midst of his second term, said he felt he should be relieved so that the work of preparing programs for the association meetings might have the interest of new thought from another president. The association requested Shearer to continue in office until the end of the present year and a committee was appointed to bring in nominations for officers for 1922 at the September meeting, which may be held at Atlantic City. Members of the association will vote on the time and place at the next meeting.

Deny Schwab or Durant Will Be Directors of Studebaker

New York, May 5—The fact that Charles M. Schwab and W. C. Durant recently have been heavy purchasers of stock in the Studebaker Corp. has given rise to renewed reports in financial circles that they are to become directors of the South Bend company. It is denied by both of them, however. President Erskine of Studebaker announced at the annual stockholders meeting that no changes in the management of the company were impending.

Another report in regard to Durant is that he has been buying into Continental Motors. This was said to be responsible for recent heavy purchases of stock in that company. Officers of Continental Motors declared, however, that there is no basis for this rumor although the company is submitting estimates and doing considerable work on the engine for Durant's new car.

Reports that Walter Flanders soon would join the Durant organization also were denied at Durant's office here.

Service Managers Disapprove Move for Licensing Mechanics

New York, May 5—Three main conclusions have been drawn by the National Automobile Chamber of Commerce from the replies to a questionnaire which the chamber sent to its factory service managers regarding legislation contemplated in several states requiring the licensing of automobile machines or of garages. They are: Appreciation of a need of improvement in service; distrust of legislation as a means to obtain it; belief that a better remedy is the education of mechanics and the attraction of more real business men into the garage business.

The predominating opinion appears to be that either form of licensing, even if ideal in theory, would be dangerous in practice, especially the licensing of mechanics. A large majority of the replies opposed that form of licensing but there was slightly less opposition to garage licensing. If mechanic licensing were adopted it seemed to be generally agreed that classification of mechanics should be a part of it.

The main objections to either form of license are that they are class legislation and discriminate against the automobile industry; that they are impractical and powerless to accomplish their purposes under the usual political administration; would restrict competition; increase the cost of work and would be merely another form of tax.

Will Seek Revision of Texas Law Imposing Burdensome Tax

Motor Trucks Singled Out to Bear Brunt of Measure Recently Passed

AUSTIN, Texas, May 6—Representative B. F. Johnson of Wichita Falls will introduce an amendment, when the legislature meets in special session on June 15, to the motor truck and commercial vehicle law, passed at the last regular session and effective July 1, with the view of relieving the measure of its most obnoxious features. He says that the law as it now stands will have a disastrous effect upon the automobile industry.

The new law provides that there shall be a license fee and a mileage tax on all commercial vehicles. Such a tax, Mr. Johnson says, would be double taxation since the people would suffer in increased prices on commodities shipped by trucks over the roads that their tax money helped to build and keep up.

An annual fee of from $30 to $120 will be required of all truck owners beside a mileage tax of 8 cents a mile, regardless of whether the truck is loaded or not. It is pointed out that there is a Federal tax on truck shipments where it is in competition with the railroads of 3 cents a mile.

The bill also regulates the speed of the vehicle and the requirement of registering the mileage at each county line and at the city limits of every town to and from which goods are shipped would necessitate "a bookkeeper as well as a truck driver to go along with the goods to see that a proper record is kept," Mr. Johnson said. The fine for not keeping the mileage record is $200, he pointed out, and the total cost of running a truck a year, according to an estimate of 10,000 miles a year, would be $580 for a five-ton truck, $600 for a four-ton truck, $250 for a two-ton truck, and $130 for a 1½-ton truck.

Mr. Johnson declared that the votes which carried the bill in the legislature were chiefly those of the rural representatives who were prejudiced against trucks. He said that the automobile interests were not against the bill nor desirous to repeal it, but that they simply wanted fair taxation.

TO MAKE AIRPLANES IN INDIANA

Seymour, Ind., May 6—Assembly of aircraft and the training of pilots, will be started here within 30 days according to C. E. Lay, promoter of the Western Airline Syndicate which has leased a three-floor building and 25 acres of ground. The company is capitalized for $250,000. A sales agency has been established in the southwest and it is expected to have an eastern agency by May 1. Wings only will be manufactured here, other parts being bought from manufacturers and brought here for assembling. The big production will be devoted to a light sport plane selling for $1200.

Chamberlain Assisted in Service Course by Brophy

Non-Technical Lectures Started in South Being Carried Into Middle West

ST. LOUIS, May 6—P. E. Chamberlain's lecture course on The Intelligent Selling of Automotive Service will be given to three different groups here this month and next. Chamberlain, who for several years was general manager of a passenger car distribution organization in the west, will give his course separately to the Oldsmobile and Buick organizations in St. Louis and to a group of service and general automotive men recruited from establishments in the city generally.

Chamberlain's course has been given so far in several southern cities, his first appearance having been in Tampa, Fla., where a large group, including executives and the rank and file in both sales and service, were in attendance. Early in the fall Chamberlain expects to go east for a number of engagements.

The Chamberlain course is non-technical, being devoted to bringing out the fundamentals of proper performance and selling of service on automotive vehicles. In addition to the lectures, there are three questionnaires which attendants at the course fill out. The course lasts two hours a night for five nights.

Until this week, Chamberlain has been handling the work alone. But from now on he will have a personal representative in the person of Paul F. Brophy, who resigned recently as executive secretary of the Carolinas Automotive Trade Association, with headquarters at Charlotte, N. C.

Speaking of the course, Chamberlain says: "The executive needs to understand the meaning of the word 'executive' and that he can neither gain money nor prestige by helping to change tires or contributing through his personal action to the general disrespect the public has for the industry. The mechanic needs to be tied up through his heart directly to new car sales and the selfish motive of his pay envelopes. The salesman needs to know his responsibility to his entire organization, not just to one department."

Find Out if Truck Buyers Can Pay - Owners' Recommendation

St. Louis, May 6—The members of the Association of Team and Truck Owners, an organization including most of the large hauling contractors of this city, were the guests of the Commercial Car Bureau of the St. Louis Dealers' and Manufacturers' Association at a well-attended dinner meeting at the Hotel Claridge. The meeting was promoted by Charles E. Pagett, chairman of the bureau, who presided. A wall card just back of the presiding officer's chair reading "If we don't hang together, we'll hang separately" told the object of the meeting.

R. C. Frampton, newly elected president of the St. Louis Dealers' and Manufacturers' Association, made his first appearance in his new capacity. He told of his experience as a truck distributor, declaring that in the motor vehicle business the time-tried caution "Let the buyer beware" had been changed to "Let the seller beware," because of the trading of used motor vehicles which has formed a feature of large numbers of sales of new cars and trucks.

Frank A. Britton, president of the team and truck owners, discussed the practice of truck distributors of selling trucks for a meager first payment without adequate investigation of the buyer's ability of making subsequent payments. He declared that this practice worked hardships on the reputable hauling contractors.

Maxwell Stockholder Files Bill to Stop Sale of Assets

Wilmington, Del., May 6—Permission to file an amended bill of complaint against the Maxwell Motor Co., a Delaware corporation with its principal factory in Detroit, designed primarily to stop the sale of the assets to a new corporation which was formed to take over the Maxwell and Chalmers Companies, has been granted Holmes Jones of this city, a Maxwell stockholder, by Chancellor Curtis. Jones alleges that through "reckless waste and dissipation" the Maxwell Motor Co. lost $25,933,194 in 16 months.

Jones filed a bill of complaint with the court of chancery on Dec. 11 last, asking for the appointment of a receiver for the Maxwell company on the ground of insolvency. Application was made for demurrer and while this was pending, Jones asked permission to amend his complaint. Meanwhile the United States courts at Detroit, Indianapolis and Columbus granted friendly applications for a receivership under which President W. Ledyard Mitchell will take over the affairs of the Maxwell company.

APPERSON BRANCH FOR BOSTON

Boston, May 6—Apperson Bros. Automobile Co., Kokomo, has taken over the business formerly under dealer management in this city and has established a direct factory branch here. The present sales and service station will be retained and improvements made. The manager of the branch which bears the name of the present company is Edwin H. Richardson. The service department will be in charge of Oscar Gravely from the Apperson factory.

KEYSTONE RUBBER LOSES PLANT

Buffalo, May 6—Fire of unknown origin destroyed the plant of the Keystone Rubber Co. at Erie, Pa., on April 28 with an estimated loss of between $350,000 and $500,000. The plant had not been in operation for some time but production was to have been resumed about May 1 with a force of 1400 men.

Hearings on New Townsend Road Bill Begin Next Week

Opposition Announced by Farmers' Organizations and Certain Groups of Highway Officials

WASHINGTON, May 6—Arrangements have been made for hearings on the Townsend highway bill beginning next week, before the Senate Committee on Postoffices and Post roads. Farmers' organizations and certain groups of highway officials have announced that they will fight the Townsend bill both in committee and on the floor. The fact that President Harding has approved the principles contained in the proposed measure, which was designed after his suggestions were received by Congress, is expected to have a great influence in securing favorable action in the Senate and House. The farm organizations are reluctant to surrender the "pork barrel" privileges of the present Federal aid system. They are unwilling to recognize the essentiality of interstate highway system. It is their contention that farm-to-market roads are of the greatest importance and Federal funds should be devoted to the development of these highways. Legisators have directed their attention to the fact that it would require more than a billion dollars annually to maintain these roads instead of one hundred million, as now appropriated by the Federal Government for cooperation of the states.

The American Association of Highway Officials has submitted another plan of highway legislation differing from the Townsend bill in that it does not call for Federal Highway Commission appropriations and adopts another formula of distribution of Federal funds. In other respects, every point contained in the highway organizations' bill is carried in the Townsend measure, indicating that they will not have many strong points for argument against the bill. The Highway Commission's measure provides for distribution of at least 60 per cent of Federal funds for the development and maintenance of highways of interstate importance and the balance on roads of state importance.

The Chamber of Commerce of the United States, at its annual meeting in Atlantic City last week, endorsed the principles contained in the Townsend bill. Senator Townsend expects to conclude the hearings and report the measure to the Senate Before June 1.

MORE ARMY VEHICLES SOLD

Jeffersonville, Ind., May 6—Twenty-seven hundred trailers, two-wheeled, one-ton capacity sold for an average of $55 in lots of five in an auction at the quarmaster's depot here. Motorcycles and side cars in lots of ten sold for $100, none in good condition. Passenger cars sold for $60 to $80. A total of 3,500 motor transport units were sold for a total of $150,000.

Reserve Board Sees Industry a Leading Factor in Adjustment

Trade Recovery in March and April Accompanied by Activity in Other Lines

WASHINGTON, May 6—That the automobile industry is one of the controlling factors in economic adjustment is indicated in the report of the Federal Reserve Board showing that the recovery of the trade during March and April was accompanied by increased business activity in other lines of endeavor. The analysis of business and financial conditions for April as announced today, gives evidence of the development of an improved condition in many sections of the country.

A digest of Federal Reserve agents' reports compiled here by the board under the classification of automobiles says: "A considerable number of the more conserative dealers in the Philadelphia district, however, feel that the natural seasonal improvement appears larger than the facts warrant as conditions in the trade were exceptionally dull last winter. A trend toward lower prices was reported in the Chicago district, while in the Philadelphia district there was rather a tendency on the part of the dealer to give extra parts or accessories in place of reducing the price on standard models.

"Stocks of cars in the hands of retailers have been reduced below January figures. It is noted in the Chicago distract, however, that caution prevails and that there is still some disposition on the part of buyers to wait for lower prices, while other factors which retard buying are the lack of capital to finance large operations and the curtailed buying power of the agricultural sections. From the Philadelphia district it is stated that operations in the fall and winter were not over 25 per cent of normal, many plants being entirely closed, while operations in general are now at about 60 per cent of normal. The improvement in business commencing in March reported by dealers in the St. Louis district has continued, but is 'fitful and irregular' and is found rather in the large cities than in the country."

Number Share Holders in GMC Increased by 30,000

New York, May 5—Stockholders of the General Motors Corp. now number more than 58,000. This is an increase of approximately 30,000 in the number of common shareholders and is regarded as significant in view of business conditions in general and the automotive industry in particular during the past eight months. This number does not include the holdings of individuals standing in the names of brokers and bankers. The tabulation shows that investors own 18,860,881 shares of General Motors common, an increase of 4,694,257 in a year. The number of common stockholders at the beginning of May 1920 was 7,193 and it is now 37,991. The increase in the number of holders of preferred and debenture stock has been much less marked, increasing from 18,943 to 20,833 in the year. An indication of the extent to which the floating supply of General Motors common is being absorbed by investors is seen in the fact that among stockholders owning from one share up to 200 shares there has been an increase of 130,000 shares in the last three months.

Advanced Production Puts Firestone Back to Normal

Akron, May 5—The Firestone Tire & Rubber Co. on Monday advanced to a production of 20,000 tires a day which is equal to the company's normal production of last year, and is above the Firestone pre-war production record. Firestone during April increased production from 10,000 to 15,000 tires a day, putting on several thousand employees.

Increased tire specifications from automobile manufacturers, and heavy demand for tires from all dealers, necessitate the big jump in production, officials state.

Sales of the Goodyear Tire & Rubber Co. for April represented an increase of 125 per cent over March sales, with prospects bright for a continued increase in dealer and automobile manufacturers tire specifications for May, officials announce. The company had anticipated a 75 per cent increase in April sales, and working on this basis added 1,200 men, increasing production to 17,000 tires a day. But with the steady pouring in of orders, it was necessary to put on several thousand more men, to re-instate the third or midnight factory shift, and to speed production to 20,000 tires a day.

INDUSTRY ON COMMERCE BOARD

Indianapolis, May 5—The automotive industries were given considerable recognition as a factor in the industrial life of this city when the committee appointments of the Indianapolis Chamber of Commerce were made public. Harry C. Stutz, head of the H. C. S. Co., and D. McCall White of the Lafayette Motors Corp., both were named on the manufacturers' committee. John B. Orman, secretary of the Indianapolis Automobile Trade Association, was placed on the membership committee, while Walter C. Marmon was named on the reception and appreciation committee.

AUSTIN RECEIVER EXPECTED

London, May 6—The appointment of a receiver for the Austin Motor Co. was not unexpected because it has been in financial difficulties for some time. The company has been handicapped since the war with too large a factory for the capital available and it was unable to reach the heavy production needed to carry the burden. Its prospects were good and steadily improving as the output of tractors and cars increased. The Colonial trade also promised well.

Mexican President Dined at First Show Held in Capital

Thirty-two Passenger Cars and Six Trucks Sold on Day Exhibit Opens

MEXICO CITY, May 6—The first automobile show ever held in Mexico City opened at noon Saturday with a large attendance and every indication of being remarkably successful. There is keen enthusiasm among the exhibitors and dealers are optimistic over sales prospects. Even those dealers who contended it would be impossible to stage a successful show admit they are greatly surprised at the interest displayed.

Factory representatives from the United States also are delighted with the success of the exhibition and declare the show would be a credit to New York or Chicago. There are numerous attractive displays together with a considerable number of special chassis cars.

Sales closed the first day totaled 32 passenger cars and six trucks.

The feature of the opening day of the show was a brilliant dinner in honor of President Obregon which was attended by all high Government officials, Diplomatic representatives of the United States, England and France, presidents of all the Chambers of Commerce in Mexico City and prominent business men.

Sixty-five vehicles are displayed at the show, which is held in the New National Theater. This includes 48 passenger cars, 11 trucks and six tractors. The exhibition includes three Haynes, three Moons, three Overlands and two each of the following cars: Auburn, Cadillac, Chandler, Cleveland, Dort, Franklin, Kissel, Lexington, Lonestar, Mercer, National, Pierce-Arrow, Ranger and Studebaker.

Single car displays are made by Apperson, Chalmers, BourDavis, Essex, Hudson, Maxwell, McFarlan, Gardner, Mercedes, Premier and Willys-Knight.

There are two Federal trucks, two Rangers, two Service, one G.M.C., one Gary, one L.M.C., 1 United States and one Wichita.

The tractors shown are: Ranger, Titan, Oilpull, Case, Hart-Parr and LaCrosse.

Foster Chosen President of Hartford Serviceman

Hartford, Conn., May 7—The Automotive Service Association has perfected its organization and elected the following officers: President, Shubel A. Foster; vice president, J. F. Dunn; treasurer, George H. Barnard; secretary, J. C. Lavoie. The directors are F. W. Cook, A. B. Hubbs, W. Pierson, W. O. Kierstead, James H. Mayers and Carl Thorngren.

It is the intention of the body to work for the common good. Plans are under way for the issuance of bulletins for the dissemination of matter of interest to the various members. The organization is made up of the foremost service station operators in this city.

N. A. C. C. at Detroit Meeting in Favor of New Townsend Bill

Plans to Develop Motor Truck Short Haul Business Also Discussed by Committee

DETROIT, May 6—The attention of the automotive industry centered this week in Detroit where meetings of the National Automobile Chamber of Commerce and committees formulated plans and policies dealing with taxation, highway problems and merchandising.

The meetings began Tuesday with sessions of the highway committee in which a redraft of the measure pending before Congress was discussed and the decision was reached to have R. D. Chapin and George M. Graham appear before the Senate committee to voice the approval of the chamber of the Townsend bill. Discussion showed that all members were heartily in favor of the principles of the bill. Plans for further educational effort in the promotion of better highways and highway transport were also discussed and policies for a more vigorous effort were formulated for presentation to chamber directors.

Will Gather Truck Figures

The anti-dumping bill now pending occupied the time of the motor truck committee and the hope was expressed that action to protect the industry against reimportation would be taken. Reports from various legislatures were read showing that only six are in session and only ten states have failed to adopt a provision of less than 800 pounds per inch of tire as load standard. Plans for mobilizing motor trucks to ascertain the exact figures of their numbers were formulated and policies to be pursued in developing the store door delivery or short haul business were outlined. It was the consensus of opinion that railways now are in a receptive mood and glad to avail themselves of the aid of motor trucks in short haul traffic. A comprehensive plan is to be presented to the Interstate Commerce Commission by a committee and the hope was expressed that such a meeting would develop definite agreements looking to the transfer of the business from the railways to motor trucks.

No Changes in Freight Rates Interstate Commerce Decides

New York, May 6—In a decision of great importance to passenger car and motor truck manufacturers and to dealers on the Pacific coast, the Interstate Commerce Commission has dismissed the complaint of the Intermediate Rate Association, which sought to require lower freight rates to Intermediate points than to Pacific coast points on shipments from the east.

This case is the latest development in the long debated question of how to adjust trans-continental rates so that railroads may fairly meet water competition. In this instance, the carriers proposed an adjustment, one feature of which was to cancel the special, or so-called rates, on passenger cars and motor trucks in carloads and apply on such shipments instead, the class rates. This would also have increased the carload minima.

Chicago, May 7—The Chicago Federal Reserve Bank yesterday announced a reduction in its rediscount rate on commercial paper from 7 to 6½ per cent. Of the twelve reserve institutions only Minneapolis and Dallas hold to the 7 per cent rate.

Chicago Opens Its Fourth Annual Display of Used Cars

Chicago, May 7—The fourth annual used car show under the auspices of the Chicago Automobile Trade Association was opened at the Coliseum this morning and will continue through Sunday, May 15. The show will be open from 10 a. m. to 10 p. m. and the displays will be changed daily, the cars sold during the day being removed at night.

The cars have been put in excellent condition and have been thoroughly tested both as to their traveling ability and their mechanical features. The prices fixed by the dealer-owner have likewise been inspected by a committee appointed by the association.

The enthusiasm and attendance at the opening of the display promises as successful exhibition, at least, as that held a year ago with chances for a greater number of sales being made probable.

Convention Will be Theme of Cobleigh's Talk in Syracuse

Syracuse, May 6—H. R. Cobleigh, service secretary of the National Automobile Chamber of Commerce, will be the speaker at the next meeting of the automotive Service Association of Syracuse to be held May 19 in the salesrooms of the DeWitt Motor Car Co.

This meeting will be immediately following the factory service manager's convention at Buffalo and Mr. Cobleigh's address will largely have to do with what comes up at that meeting. M. R. Potter, vice president of the Syracuse association, will demonstrate the use of wireless telegraphy and telephone. Besides being service manager of the Genesee Motor Car Co., Cadillac distributors, Mr. Potter has become an expert in wireless and maintains one of the largest stations in this section of the state.

HOLT PLANT DOWN FOR MONTH

East Peoria, Ill., May 6—The entire tractor plant of the Holt Mfg. Co. closed today for a month or two. The return of several thousand machines used by the government during the war and also the farmers' buying strike have created a surplus. Many of the tractors used by the army are being distributed by the government among the states for use in Federal aid road construction.

Brisk Sales for Marmon and Jordan Following Price Cuts

Applications for Dealerships Received by New York Distributors of Both Cars

NEW YORK, May 7—Marmon and Jordan, which announced a substantial price reduction a week ago, have had brisk sales both wholesale and retail in the New York territory.

Inquiries of prospects visiting the salesrooms, and of others using the mails or telephone began almost as soon as the salesroom opened Monday morning, the price reduction ads having appeared in the Sunday newspapers. Throughout the week, sales of both cars have run high in comparison with those of recent months and a large number of live prospects have been listed. Marmon has received several applications for dealerships in the territory. Jordan, which was seeking expansion of wholesale business, has placed several additional dealers and has received numerous applications which are still under consideration, as a result of the lowered price.

Jordan had 40 people in the salesroom Tuesday evening, two or three of whom bought cars on the spot. Since then not a single day has been a "goose egg," as far as retail sales are concerned. In other lines, the week has been considerably ahead of several recent weeks in the retail sales, despite the fact that it has rained almost every day. Practically all sales made have involved a trade but the used car market is active and fairly good prices have been obtained.

There is a noticeable improvement in truck sales. One dealer sold 24 new trucks and six used trucks in April. Another sold within five of his April 1920 record and his sales for January, February, March and April were within ten per cent of those of a year ago.

Dealers who have sold trucks since January 1 have had to trade in most cases and state frankly that they have made more liberal allowances than those prevailing a year ago.

Accessory and tire business is good. One large house reports sales for several years have quite closely paralleled those in the passenger car field had a first quarter's business, which was 60 per cent of 1920. April sales were better than that.

NASH APRIL OUTPUT, 3,211 CARS

Kenosha, May 5—The local factory of the Nash Motors Co. is operating 79 per cent normal and the new plant of the company at Milwaukee is gaining in production daily, according to Charles B. Voorhis, vice-president and general sales manager. The Nash factory, Mr. Voorhis says, has been increasing its production each month until the schedule for April reached 3,211 cars. Orders for May show a healthy increase over April. The low ebb of production was reached in December when 714 cars were produced.

Chevrolet and Oakland Prices Reduced; Further Cut in Tires

General Motors Considers Question But Announces No Policy Concerning Other Lines

NEW YORK, May 7—Speculation concerning the plans of the Chevrolet Motor Co. regarding prices was set at rest yesterday by announcement of an average reduction of 21 1/3 per cent for the "Four-ninety" models. The new price list follows:

Touring car, $645; a reduction of $175.
Roadster, $635; a reduction of $160.
Sedan, $1,195; a reduction of $180.
Coupe, $1,155; a reduction of $170.
Light delivery wagon, $645; a reduction of $175.

These prices bring the Chevrolet back to within $100 of those which prevailed in April 1917 before the United States went into the war. In that year the touring car sold for $550. In 1918 the price was raised to $685 and it had stood at $795 for nearly two years.

The Chevrolet company announced March 21 that if 50,000 cars were sold between Jan. 1 and August 1, a refund of $50 would be given to each purchaser. This refund will be paid at once to all purchasers since the announcement was made instead of waiting until Aug. 1.

The Chevrolet price cut was more drastic than had been expected and it came somewhat unexpectedly, following close upon reductions made on Marmons and Jordans. It is expected by the company that the demand at the lower price will largely increase production with a consequent lowering of overhead which will justify the decreases.

The price question has received the careful consideration of the executives of the General Motors Corp. for many weeks but no official information is obtainable concerning its other lines. It recently was announced that no price changes were in prospect for Cadillac or Buick.

Detroit, May 9—The price of the Oakland has been reduced $250 effective today. The touring car and roadster have been reduced from $1395 to $1145 and the sedan and coupe from $2065 to $1815.

New York, May 7—The United States Rubber Co. today announced a reduction in the prices of automobile tires and tubes, ranging from 11½ to 20 per cent. The changes are effective immediately as follows: Royal cord, 11½ per cent from schedule of last November; all chain and knobby tread tires, 17½ per cent; Usco fabric tires, 15 per cent; red and gray tubes, 20 per cent.

Conshohocken, Pa., May 6—The Lee Tire & Rubber Co. has reduced the prices of cord and fabric tires 20 per cent and puncture proof tires, 15 per cent. Tube prices remain unchanged. Approximately 50 per cent of the company's production is puncture proof tires.

Jeanette, Pa., May 6—The Pennsylvania Rubber Co. has reduced prices on all tires and tubes 20 per cent effective May 2.

Toledo, May 7—To play its part in the business readjustment now under way, the Willys Light Division of the Electric Auto-Lite Corp. today announced a reduction of $100 in the price of Willys Light.

PARTS A BIG FACTOR IN SERVICE

(*Concluded from page 9.*)

as it has to be interpreted and the order written and checked. It then flows through the factory system in the regular manner.

Factories invariably use good judgment in the way they handle telegraphic orders. If the telegraphic order is for a frame or some other part of similar nature which ordinarily would not be carried in stock, it is given every attention. However, if the order is for active parts which the party ordering should have in stock, then it is given the same attention as mail or other orders after it has been transferred from telegraphic to a regular factory shipping order.

The truth of the matter is that an order which is typed by the distributor and sent special delivery will get almost as quick service as a telegraphic order. The reason for this is that the order is already written, the parts numbers are specified and the specifications are complete, hence the factory does not have to do any interpretation except to check the order and price it as it passes through the regular routine described for such orders.

Freight the Least Expensive

If a stockroom is managed properly and its records are kept up to date, the transportation expense can be reduced to a minimum. Continual telegraph orders requiring express shipments are expensive. It increases the overhead on the stockroom considerably and thus cuts down the possible margin. A real live stockroom will have its active parts flowing in continually by freight which is ordinarily the cheapest means of transportation.

Factories have a great deal of trouble with express shipments and continually are bringing it to the attention of their dealers that they should follow closely some system of handling the parts in their stockroom and thus know what to order, how many and when. Crating and shipping of parts is an expensive factor in stockroom management. It is possible, however, by studying the weights and sizes of average shipments to reduce this expense. Standardized crates and boxes can be devised for certain articles like fenders, radiators, cylinder blocks, etc.

It is also possible to work out boxes for shipments of certain weight. These standardized crates and boxes can be purchased in large quantities, thus avoiding the expense involved in building each box or crate individually. This is a subject that is well worth the study of any stockroom manager. Defective parts returned to the factory for credit should be handled in some standard form and shipped to the factory at regular intervals. All parts should be cleaned thoroughly before they are returned to the factory.

The reason for this is obvious, as they must pass through some form of an inspection at the factory end. To realize the most from returned parts, it is absolutely essential that the parts be properly tagged, giving all the specifications of a car from which they were removed and also a full history of the part and why it failed. If the system recommended by the factory is followed out closely in all its details, considerable difficulty will be eliminated in the handling of defective parts returned for credit.

Automobile Day Officially Recognized by California

California Governor Sets Aside May 14—All Cities of State Plan Celebration

SAN FRANCISCO, CAL., May 6—The Motor Car Dealers' Association of this city has arranged for a monster pageant to celebrate Automobile Day, May 14. On that date there is to be a state-wide celebration in honor of the motor car and San Francisco's celebration bids fair to surpass that of any other California city. The pageant scheduled for San Francisco is to show the evolution of transportation and will undoubtedly promote greater interest in the motor car at this time following as it does, the "Call of the Open Road" celebration.

Mayor James Rolph, Jr., yesterday issued the following proclamation:

"The motor car dealers of San Francisco who are among our most energetic business men, are preparing a unique exhibition which will be of interest to all who witness it.

"On May 14 they will present a pageant in Market street and at the Civic Auditorium, representing the evolution of transportation in California. It will show the humble Indian squaw, the first bearer of burdens in California. Then the devout monks, plodding the trails from mission to mission along what is now our great El Camino Real, their burdens on the backs of donkeys. It will show the pony express rider, the stage coach and types of the old slow-moving vehicles of transportation. A second era represented will show the development of motor transportation from the earliest motors to the latest products of the great factories through which America leads the world in the production of motor cars.

"In recognition of the place the automobile industry holds in our civic life, and at the request of a citizen's committee, I, as mayor hereby designate Saturday, May 14, as Automobile Day for 1921."

Concerning Men You Know

M. W. Bartlett has returned to the Splitdorf Electrical Co., with headquarters at the main factory, Newark, in the capacity of vice-president and general manager.

James F. Maley has been appointed factory representative for the New England territory by the Flexo Co. of America.

E. H. Andrews, former manager of the Cabanne Motor Car Co., of St. Louis, has been appointed secretary of the Huber-Wilson Motor Car Co. of that city.

R. H. Kennedy, previously an automobile dealer, is now traveling as a special truck salesman for the Southwest Nash Co. of St. Louis.

W. F. Dickson, formerly in the construction department of the Chevrolet Motor Co., has joined the sales force of the Southern Motor Co. of St. Louis.

E. J. Welch, assistant advertising manager of the Goodyear Tire & Rubber Co., has resigned to become identified with the advertising and publicity department of the Hudson Motor Car Co. of Detroit.

T. G. Graham, formerly with the Goodyear Tire & Rubber Co. of this city and more recently factory manager for the Inland Rubber Co. of Chicago, has been named factory manager for the Mason Tire & Rubber Co. of Kent.

P. B. Brown, general sales manager of the Thomart Motor Co., after an illness of two months, has returned from French Lick, Ind., to resign his position, and will take a month to recuperate his health, sailing for his home in England on the "Adriatic" May 4.

Russell B. Reid, for several years past with Edw. R. Ladew Co. as assistant sales manager, has been made manager of sales for the Sharon Pressed Steel Co., Sharon, Pa., manufacturers of motor car frames, industrial trucks and pressed steel automobile parts. Mr. Reid will direct the sales of the company from the New York office.

J. C. Pritchett, of Indianapolis, has been named state agent for the I. J. Cooper Rubber Co., an Ohio corporation, handling tires and automobile accessories.

Willard Karl has been appointed manager for William T. Taylor, Philadelphia distributor of Apperson and Maibohm cars. Mr. Karl formerly was connected with Herbert Bros., Philadelphia.

Frank Kesser, long identified with the tire trade in Philadelphia, has become associated with the Vulcan Rubber Co. of Philadelphia, factory representative of the Vulcan Rubber Co. of Erie, Pa.

J. T. McHugh has been appointed Philadelphia manager of the Willard Storage Battery Co. He was formerly New England representative, with offices in Providence, R. I. J. R. Kennally, whom he succeeds, has been appointed district manager for the New England States.

Seth B. and George F. Mellon, formerly of Atlanta, compose the new management of the Willard Service Station, Nashville, Tenn. Both were formerly connected with the Atlanta branch service station.

Pate H. Hambright has been made manager of the Denegre Co., Birmingham, Ala.

Edward Cheney has been appointed manager of the service department of the Steam & Gas Auto Co., Birmingham, Ala., distributor of the Oakland.

D. Henry Bonner, who at the time of his resignation from the Ford Motor Co. was in charge of assembly operations in all the Ford branches in the country, has joined the Four Wheel Drive Auto Co., manufacturer of FWD trucks, in the capacity of sales manager.

J. Henry Smith has disposed of his franchise as distributor of Lafayette cars in Chicago and surrounding territory. His future plans have not been announced. Mr. Smith is well known in the automotive industry particularly through his experience in manufacturing and merchandising parts and accessories. The new Lafayette distributor is the Chicago Nash Co.

Stephen A. Howell, formerly in charge of the Chicago branch of A. Schrader's Son, Inc., has been advanced to the post of manager of the Schrader Toronto branch succeeding Harold R. Cole who is now at the main office of the company at Brooklyn.

Oakland Motors Effects New Plan for Sales in Indiana

Indianapolis, May 5—Reorganization of the retail plan under which the Oakland Motor Car Co. has operated in Indiana for some time, is practically complete. State distribution of Oakland cars will be handled by the E. W. Steinhart Co. effective April 25, according to information obtainable today.

L. S. Shoup, manager of the Indianapolis branch, Oakland Motor Car Co., is preparing to close the branch. Some of the employees of the branch will be retained by the Steinhart organization, which is one of the largest motor vehicle businesses in the central states. It operates branch stores in Terre Haute, Richmond, Lafayette and South Bend. From each of these stores, an adjoining territory of several counties is covered, Indianapolis covering a range of ten counties in the center of the state.

Future plans of Mr. Shoup have not been made known but it is understood that he plans to organize a business to take on distribution of a new car.

BATTERY CONDITIONS IMPROVED

Camden, N. J., May 5—Announcement was made by President Lloyd at the annual meeting of stockholders of the Electric Storage Battery Co. and the Willard Storage Battery Co. that since March 1 there has been a marked improvement in business and that the future looks promising. The new plants at Crescentville which will cost in the neighborhood of $2,000,000, are nearing completion. President Lloyd declined the request of the stockholders for information on the gross sales of the company. He said it would be unwise and against the best interests of the company to make the figures public. This stand was endorsed by the stockholders.

WESTCOTT SHIPMENTS DOUBLED

Springfield, O., May 7—Shipments of automobiles from the plant of The Westcott Motor Car Co. during the month of April doubled that of any previous month since last fall, according to official announcement. "There has been a pleasing revival of business in almost every section of the country" said E. H. Gilcrist, sales-manager of the company. "Our advance orders now on hand for May delivery indicate a larger number of shipments for the next month, although the proportionate gain will not be so large."

LICENSE FEES IN MINNESOTA

St. Paul, May 5—The new Minnesota law for registration of motor vehicles with the state requires payment of 2 per cent of factory list for the first three years age of the car; 2 per cent of 75 per cent of the list for the fourth and fifth years, and 2 per cent of 50 per cent of the list for the remaining life of the car. The minimum for passenger cars weighing less than 2,000 pounds is $12 and for cars weighing above this, $15. The minimum charge for trucks is $15 for less than two ton capacity; $30 for two, three and four ton capacity and $50 for more than four tons capacity. The minimum for trailers is $2.

Truck Dealers Being Urged by Managers to Join N. A. D. A.

Detroit, May 6—The Motor Truck Salesmanagers' Association has prepared for truck manufacturers a form letter which will be sent to dealers urging them to affiliate with the commercial vehicle division of the National Automobile Dealers' Association. The letter states that the N. A. D. A. is the best investment on the market today and that membership in it is certain to bring substantial business profits. The letter outlines some of the activities of the association and points out that the commercial vehicle division, devoted exclusively to truck dealers, gives advice in regard to employment, taxes, legislation, advertising, highway construction and trade information in addition to various other helpful activities.

F. PHILIP DORN DIES

Cleveland, May 6—F. Philip Dorn, for many years identified with the Automotive industry, died at his home here on Wednesday after an illness of several years. Mr. Dorn was secretary and general manager of the American Ball Bearing Co. for twenty years. He retired from active business at the time of the merger of the bearing company with the Standard Parts Co. His health which began to fail several years ago was further impaired through an accident he met with a year ago. Mr. Dorn was born in Cleveland in 1862.

FORD IN CANADA ON FULL TIME

Detroit, May 6—The Ford Motor Co. of Canada has resumed full time operations with a normal force of 2,900 men, according to Wallace R. Campbell, secretary of the company. The plant has been closed on Fridays and Saturdays each week for the last six months.

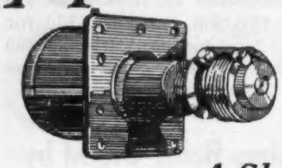
H. C. S. PLANT NORMAL

Indianapolis, May 6—The maximum production of the H. C. S. Motor Car Co. of Indianapolis, Harry C. Stutz, president, is fixed at eight cars daily, with the plant now operating at normal. At no time during the recent depression did the company's production go below 60 per cent normal.

ACCESSORIES PICNIC IN JUNE

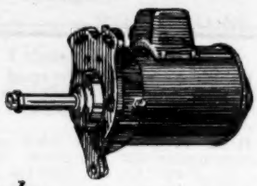
Philadelphia, May 6—The Automobile Accessories Business Association is making plans for its annual outing at the Perkiomen Inn, Schwenkville, June 17 and 18. It is expected that this year 200 members of the association will attend.

How the Electric System Works



Article V

By A. H. PACKER
Instructor, Ambu Engineering Institute



A Short Series of Articles Wherein Is Given the Fundamentals Underlying the Operation of the Modern Electric System as Applied to Automotive Apparatus

AS I reached the top of the hill from which you look down into the little town of Westville, I began to figure on the electrical topics that would be most interesting to the red head, and when I stopped at Bill Fixit's shop, the lad himself came running out to meet me. "I didn't burn out any more meters, this week," he volunteered, as I put my car in a stall, "and I am beginning to get the idea on the way motors run, too, but I don't just see how you keep running, and using current, for lights and everything, without using up all the charge in the battery." "Well," I replied, "that's where the generator comes in to action, and it is not much more than a motor, of a certain sort, made to run above its motoring speed, so suppose we consider the essential nature of its action."

We took up last week certain characteristics of magnetism, that made the motor possible, and we found that a wire carrying current tries to move across a magnetic field. We now find that this action is reversible and if we **make** the wire move through the magnetic field, it wants to carry a current, and if there is a connection from one end of the wire to the other it does carry a current. In any event, a wire cutting lines of force, or moving across a magnetic field, is found to generate a voltage, which voltage or electrical pressure sends some current, if given a chance.

In Fig. 1, is shown a magnet, with lines of force represented as going through the air from the north pole to the south. We also have a loop of wire shown in two positions, one represented by the solid lines and the other by the dotted lines and we will assume that this loop of wire is moved rapidly up and down from one position to the other. It will also be noticed that the wire is

FIG 1

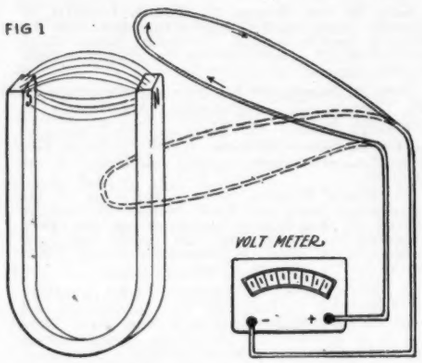


Fig. 1—The movement of a loop of wire in a magnetic field will cause a voltage or pressure to be generated that will be proportional to the number of lines of force cut per second and the number of conduits cutting the lines of force

connected to a voltmeter, so that if there is any voltage generated in the moving wire, it will cause a movement of the needle. To actually perform this experiment, it would be well to have a large number of turns of wire instead of the one turn, so as to add up the voltage of a number of turns, as it is necessary to cut through 100,000,000 lines of force a second to generate one volt.

When the wire is moved down around the S pole to the dotted position, the direction of the induced voltage and current would be as indicated by the arrow along the wire, and if moved upward the direction would be reversed. The downward motion would then tend to move the voltmeter needle, in one direction, and the upward motion would move the needle in the reverse direction. This direction of induced voltage can always be found by using the right hand rule, shown in Fig. 2, this being similar to the rule for motors, given in last week's article. The difference must be remembered, however, for the right hand is used for generators and the left hand for motors, and if the right hand rule is used for the test in Fig. 1, the arrows will be found correct for the downward motion.

Another thing will be observed in making this test, that the wire when held stationary will generate no voltage, even if in the strongest magnetism, but motion through the field does generate voltage, and this voltage is proportional to the speed with which the wire is moved. Now as the wire must continue to be moved, to generate, we must devise some way of getting continuous motion, if a practical generator is to be developed. In Fig. 3 is shown in a simple form, the construction which is used in our automobile generator. The coil is shown as rotating between the poles of a permanent magnet, in a right hand or clockwise direction, and the arrows in the sketch show the direction of the induced voltage and current. These may be checked by the right hand rule of Fig. 2, the bend shown there being in the correct position.

It will be noticed that the current in the left side of the coil goes in one direction while the current in the right side goes in the opposite direction. It is for this reason that the two curved pieces of copper are used at the ends of the coil, these being in contact with two pieces or brushes which carry the current to the terminals from which it goes to charge the battery, in the illustration shown. These curved pieces which make up the commutator are necessary in all direct current generators, because the current in any individual coil is alter-

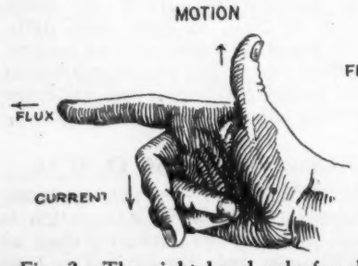


FIG.2

Fig. 2—The right hand rule for determining the direction of current when direction of flux and motion are known

FIG.3

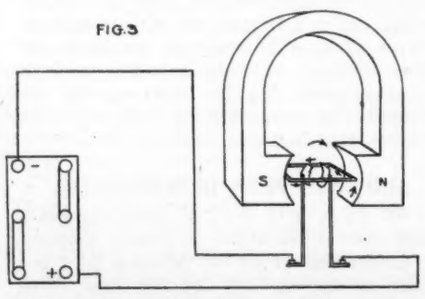


Fig. 3—A simple diagrammatic view showing the principle of construction used in motor car generators

FIG 4

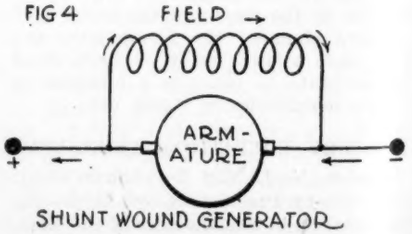


Fig. 4—Here are shown the paths of current travel in a shunt wound generator

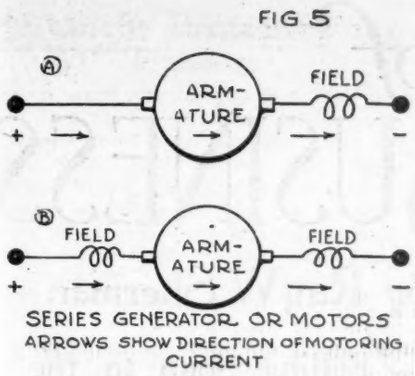


Fig. 5—Series motors and generators have the field coils and armature directly in series with each other

nating, due to the reversal that occurs when a wire goes from under the south pole to the north pole.

In most generators, permanent magnets are not used, a winding or field coil being used instead, and the frame made of soft steel, which is highly magnetized by the coil or coils. The field coils are connected in two general ways, first in shunt or parallel with the armature, one end of the winding going to each brush; second in series with the armature, all of the current given out by the armature going through the field coil. This latter construction called series wound is not used on automobile generators, but is used on the starting motors. In Fig. 4 is shown a diagram of a generator, with a shunt field, the field winding being in shunt or parallel with the armature. The arrows show the direction of the currents in the various circuits, and if we assume that the armature is generating 12 amperes, then about 2 amperes would go up through the field winding, leaving 10 amperes to go out the plus terminal to the battery, or other load to which the generator might be connected.

In Fig. 5 is shown a series wound machine, which would be used for a starting motor rather than an automobile type generator. Here current from the battery would come in at the plus terminal and at "A" would first go through the armature, then through the field and back to negative battery. At "B" the action is similar except that the field is divided, part at one side, and part at the other side of the armature. This is merely a different construction and does not change the idea of the circuits.

In Fig. 6 is shown a generator with two types of field coils, one being a shunt winding and the other a series winding. This machine is called compound wound. As in the shunt machine, the current from the armature divides, a small amount going to the shunt coil and the rest going out to battery. In returning from the battery, the current goes through the series winding, the effect of which may be either to help or oppose the action of the shunt coil. If the magnetic effect of the series winding helps that of the shunt it is said to be accumulative, but if the action of the

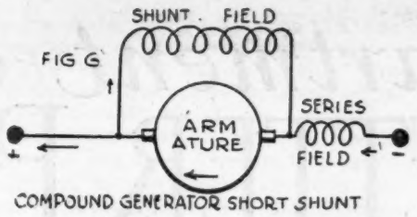


Fig. 6—Compound wound generators and motors use a series field and shunt field. The field coils may be connected in their relation with each other either long or short. The one shown above is known as a short shunt connection, as is Fig. 7, below, but in this case the series coils are split up

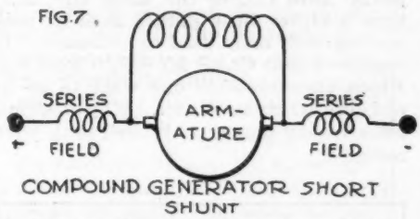


Fig. 7—Another adaptation of the short shunt winding for a compound wound machine

series winding opposes that of the shunt coil, it is called a differential compound, or bucking series machine. The bucking series is the more common of the two types, because the bucking action depends on the amount of charging current going to the battery, and is used to hold down the current at high car speeds.

In Fig. 7 is shown a similar compound wound generator, except that the series winding is divided into two parts one at each side of the armature, while in Fig. 8 is shown a diagram similar to Fig. 7 except that the shunt winding is connected to the plus and minus terminals instead of at the brushes. From the sketches it will be apparent why the connections of Fig. 6 and Fig. 7 are called short shunt, while the connections in Fig. 8 are called long shunt.

In Fig. 9 is illustrated a four pole ring

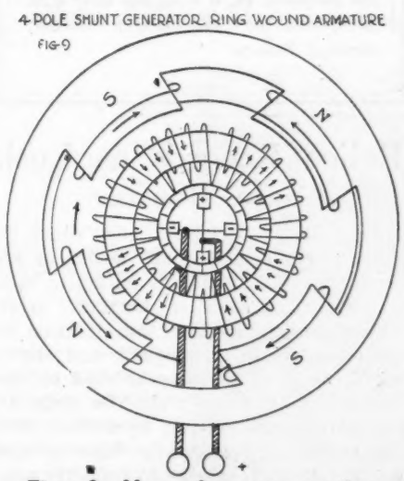


Fig. 9—How the current flows through a four pole generator, as indicated by the arrows. The machine is shunt wound

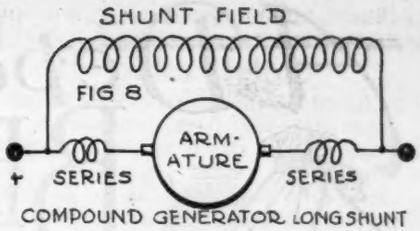


Fig. 8—Here is shown a long shunt connection between the shunt and series field coils in a compound wound motor or generator

wound machine, in which the armature is shown turning right hand or clockwise, the arrows showing the direction of current in the various parts of the circuits. We know that the current will flow from the plus terminal through the field winding to the minus terminal, and if with the right hand we grasp either the S pole or the N pole with the fingers pointing in the direction of the current, the thumb will point in the direction of the lines of force, which at the N pole will be toward the armature, and at the S pole will be in the reverse direction. Using the other right hand rule shown in Fig. 2 of this article, we find that the current in the armature reverses under the different poles, which results in all parts of the winding sending current to the plus brushes and from the minus brushes. The two plus brushes are then in parallel to collect and send the current out, and the negative brushes act similarly to bring the current back.

Referring to Fig. 9 let us see what happens when the generator stops. The wires on the armature are no longer cutting lines of force and, therefore, no longer generate a voltage, and with no voltage, the current in the field windings ceases to flow. The frame of the generator and the pole pieces then lose nearly all of their magnetism, because they are made of iron or soft steel, which does not become permanently magnetic. The slight magnetism that remains is called residual magnetism and is the only thing that makes it possible for the machine to again generate without magnetising current from some outside source.

We will now consider what happens when the machine is again started. The rotation of the armature wires in the weak magnetic field generates a very slight voltage, which in turn sends a faint current through the field windings, causing them to slightly increase the magnetic strength. With greater magnetism, the rotating wires generate a greater voltage which again strengthens the magnetizing current in the field coils, and so the rise of the generator voltage continues, and would apparently rise indefinitely, except for the fact that the pole pieces attain a condition of saturation, where further current in the field coils has but little effect. On the automobile, the generator is connected to a battery, at about the time that it reaches battery voltage, so that further increase in output merely increases the

(Continued on page 43)

A Department of BETTER BUSINESS

A dollar will be paid for all ideas accepted as Better Business—Perhaps you have some.

Conducted by Ray W. Sherman

A "Quiz" Column in the Newspapers

As a general thing the automobile sections of the Sunday newspapers are confined almost entirely to advertisements and to publicity matter furnished by the manufacturers to the dealers and by the dealers supplied to the papers. These sections are not very lively and anything that is new and interesting and not too evidently advertising for the dealer, is generally gladly welcomed by the papers. So the live wire dealer might get up a series of "Questions and Answers" which he might supply to the leading paper each week and which might deal with touring topics, road conditions and information about the car sold by the dealer. The little department might be headed in this way:

"AUTOMOBILE QUESTIONS AND ANSWERS.

"This department is conducted by R. O. Smith, local agent for the Speedo car. Address all questions to Mr. Smith at his garage, 123 Main street."

This would get a lot of free advertising for Mr. Smith and, of course, every person who was enough interested to send in a question would mean another friend for Mr. Smith and another prospect.

Takes the Women for a Ride

It is usually easy to get a man into a car for a ride but often it is a different problem with women. An Iowa dealer has developed an unusual method of demonstrating closed cars to women. On rainy or cold days he sends his salesman to take the women to or from club, committee and various meetings. This is an easy matter to arrange with the hostess or president of the club. It only requires a few minutes and he is enabled to demonstrate to a number of women at one time. The service is also appreciated and is worth its cost in advertising.

A Slogan to Fit Your Business

A catchy slogan often attracts much attention and at any rate is very inexpensive advertising. The Lozier Auto Co., Des Moines, Ia., have adopted one by which they are known about the city. The slogan runs: EVERYBODY DRIVES A USED CAR, and as the Lozier people handle used cars exclusively, it is a booster for their business. The Halpenny Auto Co., of the same city, also have a clever little phrase used in connection with their used car business. It reads: USED CARS AT USED PRICES, which almost makes one want to go in and price their used cars. Why wouldn't some catchy phrase fit in well with your business?

Sell Service Where New Cars Are Not Being Bought

IN a bulletin issued to its dealers the National Motor Car & Vehicle Corp. shows how the service department can contribute to the upkeep of the establishment. It suggests that if owners do not find themselves in a position to buy new cars at this time they be prevailed upon to have their old cars put in good condition. A car that is in a run-down condition is a bad advertisement but the service that can be rendered would be a greater advertiser both for the car itself and for the dealer and would save the dealer when the time came for the owner to trade the car in for a new one. This solicitation can be done by the salesman or, if he is too busy with prospects, by the dealer himself through letters.

Police Records as Lock Sale Booster

The sale of locks for cars could be pushed very easily by any dealer by securing the police records on stolen cars and by listing some of the thefts in an advertisement directing the attention of the motorists to this menace and showing them how the locks handled by the dealer cut down the risk. The majority of motorists are entirely unfamiliar with the extent of automobile thievery and would feel a great urge to properly protect their cars by locks if the matter was only put up to them in some strong advertisements.

Selling Soap to the Customer

Many dealers sell some soap, but in few cases are the profits large enough to pay the company soap bill. A salesman in a service station has succeeded in selling soap in quantities that make it worth while. When a customer washes his hands he hands him a can of soap with the remark, "Here, try some good soap." While the customer is washing he explains that a can should be carried in every car, as it and a rag will enable a driver to wash his hands without water. In many cases the farmers are sold three or sometimes six cans.

Boys Like the Junk Magnets

Almost every shop soon collects a large stock of old useless magnets. These are often junked but there is always a good market for them. By placing a number of magnets in one corner of a window a crowd of boys was soon attracted who carried them off at ten cents each. Although the stunt did not make the dealer rich it netted a little cash and the profit was nearly 100 per cent.

Sold Banker Stock in His Business

A young Iowa dealer who had only a limited amount of financial backing and business experience sold a banker an interest in his business. Needless to say he has had excellent banking service and plenty of reliable advice on financial matters. Doctors, real estate men and many others who meet large numbers of people are excellent salesmen if interested in some particular business.

He Hunts for Trouble and Corrects It

At county fairs and baseball parks motorists often have trouble or the day is spoiled by the pumping up of a flat tire. A young dealer equipped a service car with a supply of tires, tubes, spark plugs and a power pump and sent it and a good mechanic to various gatherings and rounded up business on a number of occasions. The service was highly appreciated and did much to advertise his business.

Pavement Protectors for Tractors

If it were not for the fact that the lugs injured the pavement many more farmers would haul various loads to town with their tractor. One Iowa dealer had wooden blocks made that fit between the lugs so that the machine could be run anywhere and sold several sets at a nice profit and also enabled his customers to use their machines to greater advantage.

Politicians Offer Field for Salesmen

Get in touch with the political candidates in your city. Those candidates who are successful in the fall elections will be in the market for new cars in all cases where they are elected to worth while long-term jobs. The dealer who makes friends of these candidates now will be the dealer who will get their business in the fall.

Sells Valve Cores by the Box

At frequent intervals motorists wish for a valve core, but as they are hard to carry without damaging few motorists have an extra one. One dealer set about to sell a box of cores instead of one at a time when a customer came in. As the price was considerably lower by taking several, the patron will usually take a box, as in many cases he has been inconvenienced by not having an extra. As the larger sale is made in practically the same time that it would require to sell one, the dealer is making more per minute invested in selling.

Sells Old Automobile Engines

Almost every dealer has from one to a dozen old automobile engines around his shop. By attaching governors and belt pulleys and building a stand for the engines a dealer has sold a number of used engines to farmers. These engines were used to run saw mills, corn shellers, and various farm equipment. Almost every farmer needs a powerful engine at various times in the year but cannot afford to invest in an expensive power plant for such a small amount of work. If he has no tractor a used automobile engine fits his needs well.

Using the Telephone as Prospect Getter

As a general thing a good percentage of all the folks who have telephones in their homes can afford to own automobiles. This being the case it might energize the dealer and get him out of a selling rut to select four or five names of strangers at random in the telephone directory and to then call them up about 6:15 or 6:30 o'clock in the evening when the man in the house would be pretty sure to be at home. Upon calling them up the dealer might give them this line of talk:

"This is the So-and-So garage. Are you the Mr. Davis who is interested in a ——— automobile?"

It is nearly always the case that a man will pay more attention to a phone call than to a personal solicitation call and so such a question would undoubtedly get responses from a large number of the men called which might lead to sales. And if such a scheme did nothing else it would sharpen the dealer's wits and, as has been said, it would be calculated to get him out of the rut.

Advertises Every Car Sold on Tire Covers

ONE dealer is cashing in on free advertising when he places on almost every new car that he sells a tire cover bearing the announcement "ANOTHER ——" in large lettering. When selling a new car he usually manages to sell one of these covers to the purchaser, by giving it to the customer at cost. The advertisement draws the public's attention to the large number of owners of that particular make of car in the territory.

Example of Work Done Brings Business

A service station that makes a specialty of high-grade repainting work, believes in displaying an example of its work to the public. An old car which had been repainted stands in its show-window and a card attached reads: "WHEN YOU FIND REPAINTING LIKE THIS IT IS TIME TO PLACE YOUR ORDER." The display is instrumental in bringing in much repainting work.

Use Your Camera as Sales Help

Spend part of your advertising fund for a camera. Catch the interesting things the cars or trucks you are handling are doing. Have the pictures enlarged. Line your office with them. They shout results. Send prints to your manufacturer to show him what you are doing with his line to push it along. Photograph everything. Catch your cars plowing mud. Catch your truck pulling the other fellow's out of the mud. We find these silent salesmen are winners.—E. H. Birdsall, Madrid, Ia.

Cars Cleaned While Stored

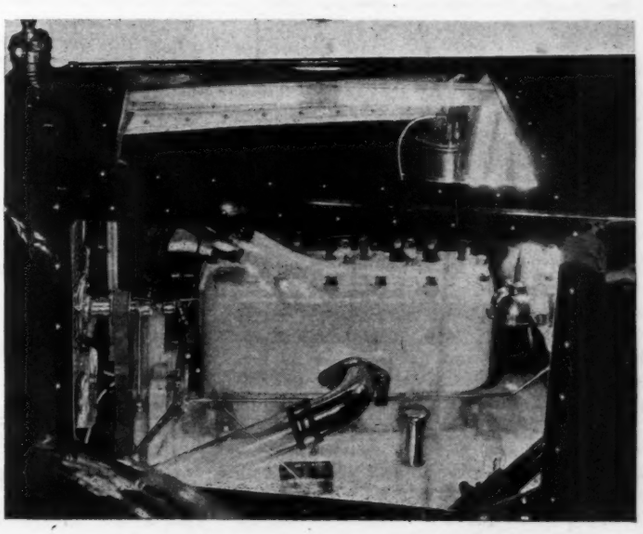
A dealer has built up a good side line to his business by washing and polishing cars.

Whenever a tourist or one of his customers stores a car with the dealer, he is asked how long he intends leaving it. If the time is sufficient, the dealer suggests that it be washed and polished while in storage. The garage has several cloth covers on hand, so that the car may be covered after being polished. In this way it can be kept in good shape until the owner calls.

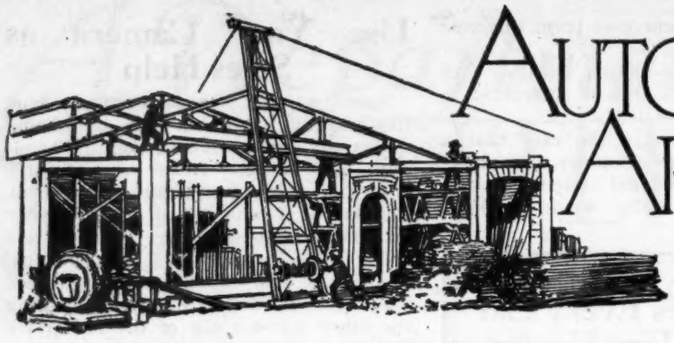
The Screen to Show the Speed of Service

A garage that was known for the high grade work turned out by its mechanics increased its business considerably by showing on the screen between shows in a popular movie house pictures of a man having trouble with his car while in the country, going to a nearby farm house and telephoning to the garage man whose 'phone number was ———. In a few minutes, according to the screen, a mechanic arrived; the necessary adjustments and repairs were made and the satisfied customer continued on his journey.—F. J. Joslin, Independence, Iowa.

Plate Glass Windows in Hood Create Interest



An attention attracting idea for dealers' demonstrating cars is shown at the right. This hood with plated glass windows in it on a Gardner car was productive of interest at the recent Denver show



AUTOMOTIVE ARCHITECTURE

Planning *and* Building Problems

Corner Lot Preferable to One Inside

PLAN 333

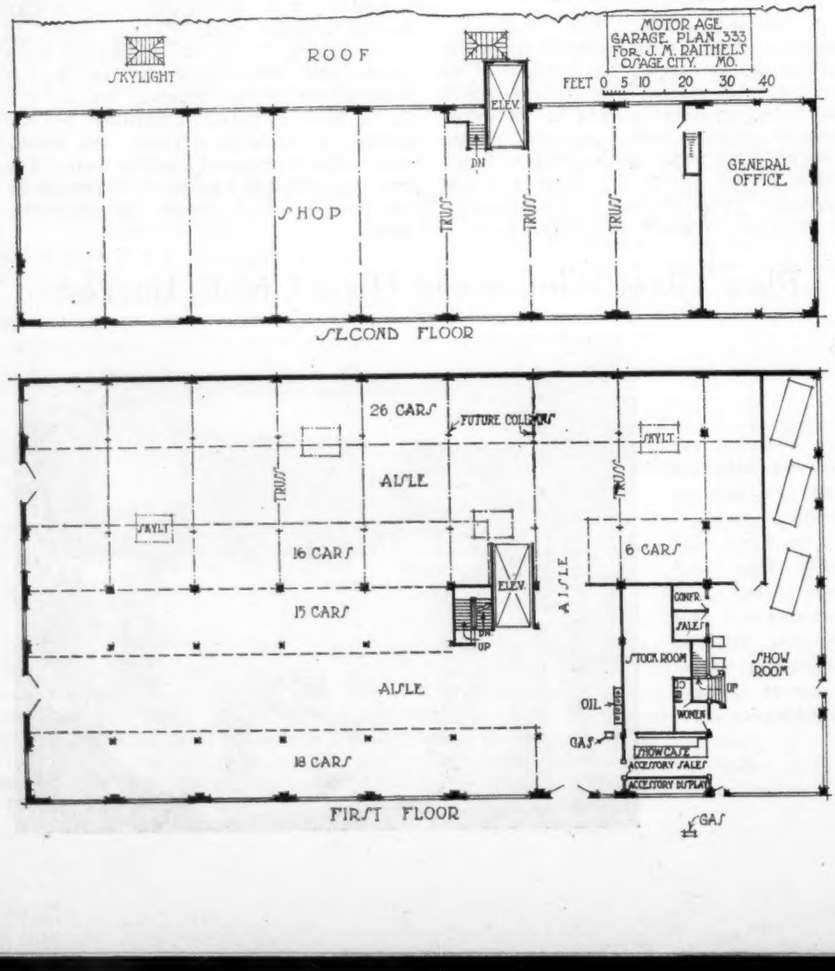
We are planning a garage for storage of about 75 or 100 cars and would like suggestions from you. We have two different size lots on which to build but decided to ask MOTOR AGE which one would be best suited for us. The one lot is 55 ft. front and 198 ft. deep, and the other is 104 ft. front, on a corner and 198 ft. deep. We expect to store cars on the first floor with a show window large enough for display of one car and a wash rack. We will also make use of the basement as we do not believe there would be room enough on the first floor for the repair shop. The office and a ladies' restroom can be on the second floor as well as the paintshop.—Raithel's Garage, Osage City, Mo.

We do not hesitate at all in choosing the corner location for your garage, as it is by far the most advantageous, other things being equal. The difference in area, however, one being double that of the other, will make the cost of the corner building double that of the one on the inside lot.

Also if you devote most of your first floor to storage you can accommodate 100 cars and have the entire second floor for a repairshop, etc.

All things considered we suggest that you eliminate the basement idea, build a one story building over the entire lot with the half on the corner side carried up two stories. Later if you need more storage space or more shop space you can build the inside half up two stories.

Storage Plan for 100 Cars With Shop on Second Floor



Automotive Architecture

IN this department MOTOR AGE aims to assist its readers in their problems of planning, building and equipping service stations, garages, dealers' establishments, shops, filling stations, and in fact any buildings necessary to automotive activity.

When making requests for assistance please see that we have all the data necessary to an intelligent handling of the job. Among other things we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated, and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how large an accessory department is anticipated.

This arrangement would be nearly equivalent to the cost of a two story and basement building on the inside lot, but would be infinitely superior to it from a utility standpoint.

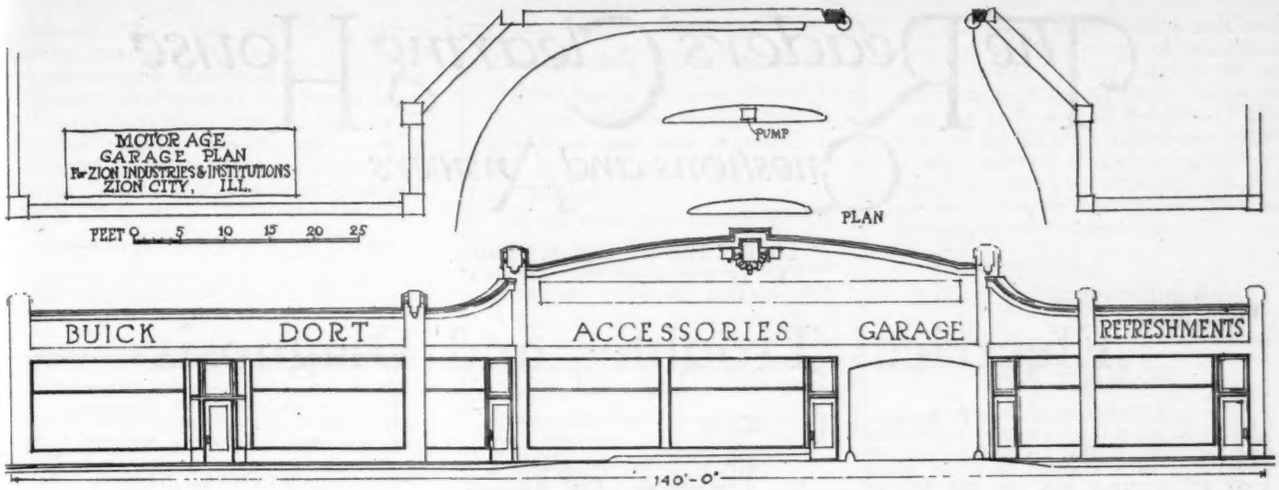
We are making our layout on this basis but you could, of course, build the two story and basement proposition on the outside half of the corner lot, or the two story complete on the entire lot or even the two story and basement on the whole lot depending on the amount available for investment.

The general office is on the second floor, only the salesmen's desks and private rooms being retained on the first.

The long narrow showroom on the front could be very well used for displaying special used cars if the space is not needed for new car display.

We recommend the downstairs location for the women's restroom though some position other than the one we show may be found more desirable.

If desired the front section could be built two stories high way across, then the office could occupy the far end having the whole section in front of the elevator for storage or shop at your discretion.



An Attractive Front with a Filling Station

THE problem of the gasoline filling station in connection with a garage is one that is confronting many readers. The value of the filling station as a means of bringing trade to the accessory store and possibly to the car sales department is recognized but at the same time it is also recognized that the sale of gasoline interferes with inside activities. Gasoline customers must have prompt attention or they will be on their way, annoyed. Therefore, it often happens that unless a special clerk attends the pump, an accessory salesman must leave his customers to make a gasoline sale that will net but a few cents.

Takes Valuable Space

MOTOR AGE has always been opposed to sacrificing to a filling station a corner that would be valuable for display purposes and yet many times it is impossible to place the pump at the curb either on account of heavy traffic or because of city regulations. A fairly good solution of the general problem is shown in the above plan. It brings gasoline customers in close contact with accessory displays, makes it possible for them to get gasoline upon entering or leaving the garage, keeps them out of the way of street traffic and makes the car display more valuable by opening up more window space. An outfit of this size should have a special attendant and perhaps two on busy days. The only disadvantage is the amount of space given to it, but since the frontage is really increased, this disadvantage is offset.

One Hundred Thousand Miles Without Service

(*Concluded from page 11.*)

well vacuum tank but similar in size. This tank will draw the lubricating oil from the crankcase by the force of the vacuum to the filtering chamber within the tank. A very fine mesh screen is located inside that removes all foreign material from the oil, if any is there and then the oil is passed over a heating grid on the exhaust manifold, the action of which boils off from the oil all the volatile matter such as the gasoline which has leaked down by the piston rings.

These volatile parts are not wasted either for they are put back into the manifold where they enter the combustion chamber and are burned. Many tests have been made with these instruments and one that is very startling, is where the operator willfully dilutes the lubricating oil to 50 per cent, that is the lubricating oil was mixed with an equal volume of gasoline. Then the car was run 200 miles and at the end of this time the oil failed to show any gasoline content at all.

There remains but one more important thing to do to the engine to make it last for the 100,000 miles without service work. There is bound to be some collection of carbon and to keep the valve seats free from dust they must be especially considered. Some people have obtained very successful results by making the edges of the valve slightly flexible.

This flexibility does not have to be sufficient to be measurable, only a very minute amount of fluxation is required. The carbon particles on the valve surface and seat are then apparently flecked off by the micrometer grating action that is constantly taking place. Still another method that has been developed is the rotating valve and this method has every assurance of being seen generally on our cars.

The writer has had occasion to examine the valve rotating scheme and has witnessed some rather remarkable results. Eighteen thousand miles of travel with an overhead valve engine showed that the valves were just as shiny as any piece of silver could be. The principle of the scheme is simply to give the valve a slight twist when it ascends and allow it to come down without a twisting. Thus a new seat is found every time the valve is lifted and this gradual turning is in effect a constant valve grinding going on while the engine is operating.

Other developments which have taken place recently will have a decided effect upon the chassis of the car in prolonging its life. For example, there is the transmission without a gearshift lever, which shifts the gears without clashing. Thus there is no strain on the mechanism and the gear teeth are not subjected to that heavy grating action that is so injurious. Furthermore, a transmission that allows the gears to be shifted easily will naturally stimulate the owner to more frequent gear shifting, thus relieving the engine of strains and stresses which it does not need to endure.

TURN A VACANT LOT INTO MONEY

(*Concluded from page 12*)

will need surfacing with cinders, gravel or crushed stone. The yard will also need to be fenced in, although this can be dispensed with at first if the cars are watched. The surfacing can best be done by applying a thin layer first, just enough to keep the mud from splashing when it rains, adding more from time to time as needed to keep the yard clean and free from ruts and hard surfaces. Unless the soil is gravely or sandy, it is rather unsafe to use it to fill low places. Clay or loam will never get solid and if there are low places to be filled use ashes, cinders or gravel which will pack hard and make a good surface.

Should Prove Profitable

Another side issue that could be worked in summer and all year round in the southern and western states is the wash rack. The best kind of washing can be done out of doors and plenty of sunshine to show up the dirt. All the equipment needed is a concrete platform with a good drain to lead the water away. Altogether, an open air garage of this sort is quite feasible and under the right conditions should prove a very well paying investment.

The Readers' Clearing House
Questions and Answers

CONDUCTED BY ROY E. BERG
Technical Editor, Motor Age

Electrical Troubles and Diagnosis

Q—A Buick D-45 misses at high speed (30-35 m.p.h.) or on a hard pull in low and more so if the headlights are on. The lights vary a great deal too, being good at 15 m.p.h. and up and dim at lower speeds. The battery is all right, and I have gone over all wiring, breaker points and condenser. Have installed a new switch panel and ammeter but this doesn't seem to help. Advise the trouble and how to remedy.

2—A Northeast generator on a Dodge Brothers car will not charge over 5 amp. The brushes were worn out so we removed generator from car, took it down, thoroughly washed out all the carbon, dust and oil, tested brush holders for grounds and found them O.K. Also tested field coils and armature for grounds and all were O.K. Did not have time to test armature for shortened or open coils. This car was reassembled with new brushes carefully fitted but all it will produce is 5 amp. The third brush is set for maximum. Will show discharge of about 2 amp. if moved to limit in opposite direction. Can third brush holder be too short?—George Brown, Campbellsport, Wis.

1—Every detail given points to a defective battery. The fact that the lights fluctuate to an excessive degree indicates that the battery is weak. The hydrometer reading may be correct for a fully charged battery but the plates may be badly sulphated and the gravity of the electrolyte may have been brought up by the addition of acid. One way to conduct a test is to connect a new battery in the circuit and see if the trouble still exists. If the third brush is set at the maximum position and all conditions are correct the generator output should be at least 10 amp. The normal rate at which the generator is usually set is 6½ amp. and the setting of the third brush should never give a lower output than 4 amp. or greater than 10 amp.

In order to measure the total generator output, a portable ammeter capable of reading at least 15 amp. should be connected, as shown in Fig. 1, between the No. 3 binding post on the reverse current cutout and the positive terminal of the charging indicator. In cases where such an arrangement is not convenient, the ammeter may be inserted between the generator positive binding post and the cable normally attached thereto. If the latter method is used, the ammeter must always be protected from the heavy flow of starting current by temporarily short-circuiting its terminals with a strip of copper whenever the engine is being started.

The reading of the portable ammeter should correspond exactly to the reading

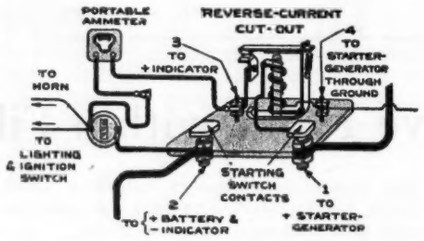


Fig. 1—Ammeter connections on Dodge Brothers car for taking generator output readings

of the dash instrument and thus it is possible to get an accurate check on the instrument. The charging rate measured this way will ordinarily be found to be from 1 to 2 amp. less than the total output of the machine, due to the fact that part of the current is consumed in the ignition system.

When new brushes are installed they should always be reseated.

The commutator should be examined carefully to see that it is absolutely true and that the mica is not extending above the surface of the commutator. The brushes can be seated correctly by a running in process. This is done by allowing the generator to run at high speed from 20 to 30 minutes. The requisite high speed can ordinarily be obtained by disconnecting the driving chain and running the machine as a plain series motor with the fuse removed to open the shunt field circuit.

MAXWELL WIRING

Q—What makes the brushes in the generator on a Dodge Brothers car wear out so rapidly? The first set of brushes lasted only about 1,000 miles. Have put in three sets since but they will not last 50 miles. Commutator has been smoothed and brushes sanded. Advise cause and way of remedying same.

2—Advise how to change the wiring system on a Maxwell from a double 6-volt battery to a single 12-volt system. Would such a change be worth while and how much new equipment would be necessary? —M. Granberg, Balaton, Minn.

1—There is no reason why the brushes wear out rapidly unless it is the quality of the brush material or the commutator is not smooth. There is a great possibility that the mica is extending above the surface of the commutator far enough to cause rapid brush wear. This being the case the trouble can be remedied by undercutting the mica.

The difference between the 1917 and 1918 Maxwell was the use of a straight 12-volt battery, instead of the four terminal split battery, and the use of a simple switch instead of the 6 terminal series-parallel switch. The motor-dynamo was changed internally so as to charge at 12 volts instead of 6 volts. The dash panel was retained with but slight changes.

The late 1919 and early 1920 models used third brush for regulation and had the cut-out mounted on the motor

1920 Maxwell Wiring—Simms-Huff System

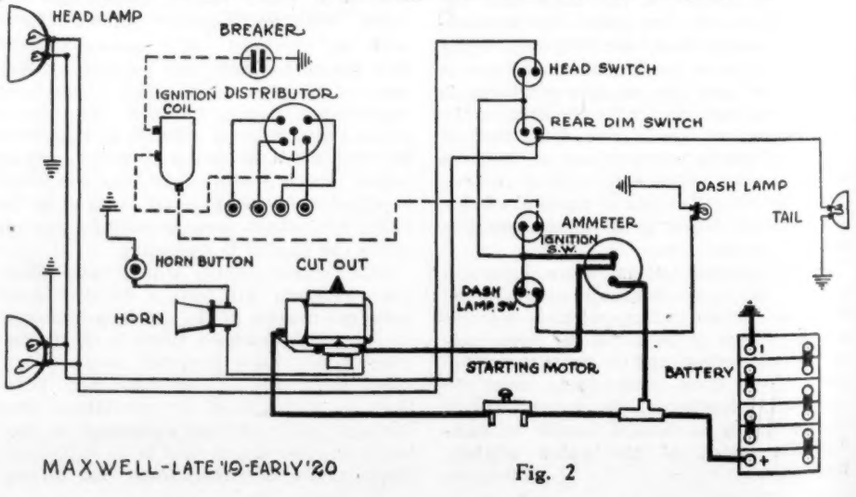


Fig. 2

dynamo. To make the change worth while, it would be necessary to have the motor-dynamo exchanged or rebuilt for the early 1920 model. This would eliminate the dash panel regulator, the series-parallel starter switch and allow a straight 2 terminal 12-volt battery to be used. Wiring diagrams of the two systems are shown in Fig. 3 and Fig. 4.

RUNNING WITHOUT BATTERY

Q—On a Buick C 37 which has been converted into a 1½ ton truck we would like to do away with the storage battery. We start the engine on dry cells, then switch to the generator for ignition and lights. If we remove the battery what must we do with the cable connected to the positive and negative terminals? Could we use dry cells altogether instead of a storage battery?—Elmer Copeland, Libertyville, Iowa.

We do not advise removing the storage battery. The system is designed to use a battery and it would be contrary to the advice of the manufacturers to run the generator without the battery in the circuit. The average life of a storage battery is about 1½ years and at a cost of $35 or $40 it would not be a burden to purchase a battery every other year.

INSTALLING MAGNETO

Q—Can I install a Bosch 6 DU magneto on a 1916 Pathfinder? With the present system of ignition, cylinders 4 and 5 do not operate properly.—E. Hamick, Chicago.

1—It is possible to install a Bosch 6 DU magneto on the car you mention but we rather think that you will be going to a lot of expense. In a good many instances the Bosch Magneto Co. furnishes brackets and fittings for mounting their instruments on most of the popular makes of American and European cars. We do not believe you will be able to obtain these brackets to fit a Pathfinder and you would have to make them up yourself.

Before you go to the trouble of doing this why don't you check up the present system of ignition and cylinders 4 and 5 with the possibility of remedying your present trouble? We suggest that you check up, first, the distributer points and see if the brush makes good contact at cylinders 4 and 5. Also examine the leads going from the distributer to the plugs.

Your trouble also may not be ignition but carburetion. It may be possible that the fuel, in its surging through the manifold, is going into cylinders 4 and 5 in a more or less raw state. Naturally this would have something to do with fouling up your plugs and what you might be construing as ignition trouble is, in reality, carburetion trouble.

In installing a Bosch magneto, probably the easiest way would be to remove the present generator and in its place put the magneto. This, however, leaves you without a generator. Another way would be to leave the present lay-out as it is and put a gear on the pump shaft and mesh this with a gear on the magneto which would then be placed in the side of the engine on a special bracket fastened to the crankcase.

The Readers' Clearing House

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by someone else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

It has been our experience that in the long run you are better off, on engines of the older type, by leaving the construction as it is and simply make sure that the units are all functioning properly. If all the other cylinders excepting 4 and 5 perform all right, the trouble is either in those two cylinders, the plugs, cables leading to them or the distributer mechanism on the magneto.

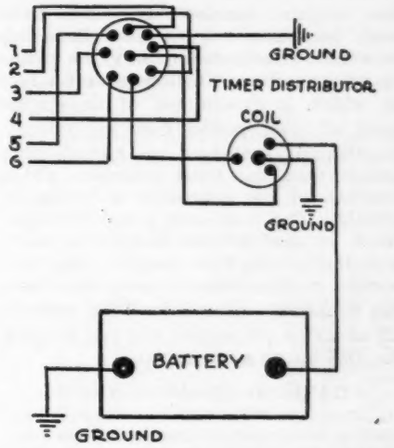


Fig. 4—Diagram for changing 1914 Stevens-Duryea from magneto and battery ignition to battery ignition only

CHANGING IGNITION

Q—A Stevens-Duryea 14 has magneto and battery ignition. Can we put a single coil on and still use the same distributer? If so, give details.

2—Give name of some ignition company that manufacturers a combined magneto and battery switch. The present system is Bosch Du 6 and Connecticut distributer. —Hugh B. Hutchinson, Vancouver, B. C.

1—This car was equipped with a Bosch Two Independent system. Ignition is permitted either by the magneto on one set of spark plugs, by the battery on a second set of spark plugs or by both operating together with both sets of spark plugs in use. The same coil can be used or a single coil can be installed and the battery side used. Fig. 4 shows a wiring diagram if only battery ignition is used.

2—You can undoubtedly secure a switch of this type from any of the magneto manufacturers.

BATTERY TROUBLE

Q—What makes an Overland 90 cut off the ignition and lights when you step on the starting pedal, even when the battery is in full charge?—J. C. Brown, Hastings, Mich.

Indications are that the battery is at fault. In spite of the fact that the gravity of the battery is up to full charge it is no assurance that the battery is fully charged. If enough acid is added to a battery that is badly sulphated the gravity can be raised to a point of full charge and still the battery may be very weak. It would be advisable to remove the battery and put a new one in its place and if the same trouble exists you can then be sure that it is not caused by the battery. It is possible that there is a heavy ground when the starting pedal is pressed down but is not probable.

1917 Maxwell Wiring—Simms-Huff System

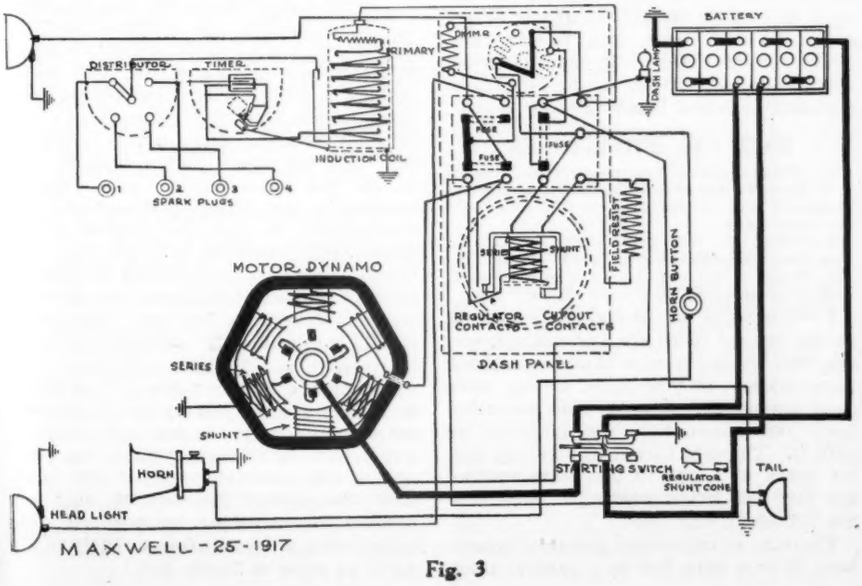


Fig. 3

MISCELLANEOUS

HORSEPOWER RATING

Q—Why is a Ford engine rated at 22 hp. and an Oakland at 18 hp. when the Oakland is a six and the Ford a four cylinder?—Gerald Hoffman, Princeton, Ill.

According to the S. A. E. rating the Ford engine develops 22.5 hp. This figure is obtained by a formula which takes into consideration only the cylinder size, number of cylinders and a factor which is determined at an engine speed of 1,000 piston feet per minute. The Oakland cylinders are considerably smaller than the Ford cylinders which accounts for the difference in rating by formula. The maximum horsepower obtained by the Oakland engine is about twice that of the Ford engine. We have records of dynamometer tests that have been conducted on average Ford engines and as a rule the engine will not develop over 18.5 hp. as a maximum.

CHANGING TRANSMISSIONS

Q—Can the transmission from a one-cylinder Brush car be put in a Metz two-cylinder car using the same jack shaft that is now in the Metz? About what would this cost? The Metz car and engine are in good shape except the main drive shaft. Have a new Brush transmission.—Q. N. Trotman, Gatesville, N. Car.

You are attempting quite a job. You ask whether or not it is possible to move a transmission from one car into another and all we can say is that it can be done but we doubt very much whether the cost is justified by the net results. We have never had occasion to perform a job of this kind and it is naturally largely up to the individual doing the work to figure out the necessary procedure. A good mechanic who has a shop available can do most anything along this line.

We have seen cases where a good mechanic has taken the rear axle from a car like the Ford and hooked it up to a three speed transmission and installed this in a Metz friction drive chassis, but it calls for much special machine work and unless a man can do the work himself the cost is prohibitive. We have had considerable experience and have made observations of rebuilding jobs like this and do not as a general thing advise anyone to attempt this kind of work unless he has the machinery and tools with which to do it and does not care for the item of expense.

PREVENT GREASE LEAKAGE

Q—What is the most successful method used to prevent the leaking of grease from the Ford left rear axle housing?—W. S. Phillips, Grayson, Ky.

There are several methods used to prevent leakage of this kind. Perhaps before suggesting any remedy it would be well to find the cause for this trouble. We have been told by those who should be in position to know that in the majority of cases this trouble can be attributed to the lubricant working from the transmission through the drive shaft tube and into the differential housing. The result is that there is altogether too much lubricant in the housing and it is forced along the left rear axle shaft as the latter revolves. One way to stop this but which entails a little work is to disconnect the drive shaft tube at the transmission end.

A felt washer is then placed inside the front universal ball cap back cover, so that it surrounds the projecting end of the universal joint which fits into the transmission.

By thus surrounding the transmission shaft with the felt washers the oil cannot work through from the transmission and consequently will not flow down the

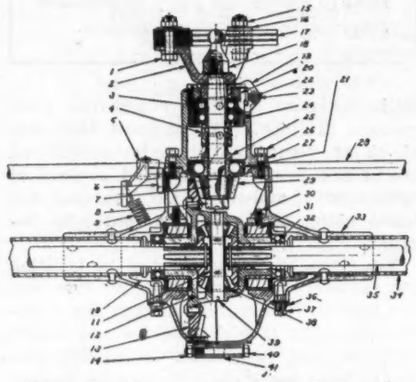


Fig. 5—Cross sectional view of Briscoe 34 rear axle assembly showing points of adjustment

drive shaft tube. A large steel washer should be slipped over the universal joint before it is placed back into position on the transmission end.

Ordinarily about one pound and one-half of grease is all that is necessary to put in the differential housing. Of course, if the felt washers at the end of the axle shaft are worn the leakage will become worse. In applying these, two of them should be placed on the axle shaft near the roller bearing next to the differential. A third washer is placed near the outside end of the axle shaft. If the thrust washers in the differential are worn they allow the axle shaft and differential to shift from side to side and pump out the grease. It usually causes the grease to leak out at the left wheel first as that wheel is near the drive gear.

RACE CAR WHEELBASES

Q—Please advise the name and address of a manufacturer who makes differential housings and gears for a one to one ratio for race cars.

2—What is the regulation length of wheelbase of the racing car of today?

3—What is the regulation size of wheel?—Guy R. Kenyon, Methuen, Mass.

1—This calls for special work and we do not believe there are any manufacturers who would furnish these as a stock proposition. If you have access to a good automotive shop in your neighborhood you might take the question up with it. There is little or no call in fact for gears of a one to one ratio and we are just wondering where you expect to use a ratio of this kind.

There is no regulation length of wheelbase of race cars, but as a general thing you will find most of them around one hundred inches. For half mile tracks ninety-six inches would be better.

3—Most of the tires used for track racing average about 32 by 4½ in. Here again we might say there is no regulation size, it all depends on the track, the car, and the speed with which it is to be driven for best results.

DORT POWER CURVE

2—Publish power curve of the Dort engine.—Eric S. Hope, Dexter, Maine.

The power curve of the Dort engine is shown in Fig. 6.

BRISCOE AXLE ADJUSTMENTS

Q—Publish diagram and instructions for the various adjustments of the drive shaft and differential of the Briscoe, Model 34.—H. P. Rollman, Wyomissing, Pa.

A sectional view of the Briscoe 34 rear axle assembly is shown in Fig. 5. The drive pinion and shaft are mounted with their bearings in the drive pinion housing at the front of the rear axle. If the pinion has to be changed, the pinion housing has to be taken out by removing the center bearing of the rear axle brake shaft and the 6 bolts in the housing flange. Then remove adjusting nut clamp bolt and lock, and screw out the adjusting nut with bearings and pinion. Next loosen up the drive pinion nut and remove the lock screw in the spacer nut between the bearings.

Then screw the 2 spacer apart which will free the pinion or the shaft. When replacing the drive pinion thrust bearings remove the ball on the front end of the pinion shaft and screw the spacer nuts apart. Then unscrew the thrust bearing adjusting nut and pull out the bearings. When assembling the thrust bearing, tighten the thrust bearing adjusting nut securely, slip the shaft through, put on the spacer nuts and the large bearing. Next put on the drive pinion, key it, tighten the nut and insert cotter pin. Set up the spacer nuts so they are loose on the shaft when the rear universal spider is put on the shaft with the key in place.

Place the lock washer with tongue in the keyway and tighten the ball nut locking it by bending the tongues over the flats of the nut. Set the spacer nut apart fairly tight and tighten the lock screw locking it with a wire. The pinion shaft should then turn free without any end play. Screw the drive pinion adjusting nut into the drive pinion housing and mount the same on the axle. Before tightening the clamp bolt, set the adjusting nut so that the outside of the pinion teeth are flush with the ring gear teeth. This can be observed by looking through the sight plugs at the front of the left rear axle housing. The gears should have .004 in backlash or play between them. To adjust the ring gear first remove the differential adjusting lock and screws. If there is no play between the gears, loosen left adjusting nut a turn or two and tighten the right nut a like amount or until the gears have the correct amount of play. A method for obtaining an accurate gear adjustment is explained completely in the April 14 issue of MOTOR AGE.

Regrinding and Reboring

Q—Have you made any accurate tests to determine the comparative advantages and disadvantages of grinding and boring cylinders, including cost, accuracy, etc.?

2—Does sufficient carburundum remain in the cylinder to effect wear? Does the cylinder heat engine to contract out of line or round?

3—What companies bore their cylinders at the present time?

4—On an old Buick which throws considerable oil from the pushrods, would you consider it advisable to connect part of the carbureter suction to the breather pipe to relieve the pressure in the crankcase?

5—Can the clutch be made more easy of engagement? Have used Neatsfoot oil without result.

6—What is the b.h.p. of a 1913, model 30 Buick?

7—In cutting down a spring is it better to remove a short or a long leaf?

8—If a grinding compound or emery and oil is used for lapping in pistons, can it be all washed out?—P. M. Farrer, Fresno, Calif.

1—The Readers Clearing House Department does not conduct any tests of this kind and, therefore, we cannot make any statements that are results of our own experience. The subject of regrinding or reboring cylinders is an open question with very good arguments for both methods.

The actual cost of regrinding or reboring a cylinder block is about the same but the equipment necessary to obtain accuracy by the regrind method costs a great deal more than a reboring outfit. As far as accuracy is concerned the companies manufacturing both kinds of equipment claim that absolutely true cylinder bores can be obtained with the use of their equipment.

2—Sufficient carburundum to cause undue wear does not accumulate in the pores of the metal. When a cylinder is reground dry there is considerable heat generated. A few tests were conducted at the Rock Island Arsenel using a dry regrind with a heavy cut and the result was that sufficient heat was generated to cause a taper hole and the job was rejected. These cylinders were then taken and reground wet, removing .005 of metal and the finishing cut was taken dry with the result that 95 per cent of the blocks were reclaimed. If the regrinding is in the hands of experienced men and no attempt is made to remove too much metal at one time very accurate results can be obtained.

3—We are not in a position to furnish the names of the companies reboring cylinders at the present time.

4—If oil is being thrown from the push rods it is an indication that the valve guides and bushings are badly worn and it is very probable that you will find the valve stems and tappets badly worn as well. The proper thing to do is to install new guides and any other parts that are found in a worn condition.

5—If Neatsfoot oil fails to remedy the grabbing it will probably be necessary to replace the leather on the cone.

6—We do not know what hp. the engine develops but the advertised hp. was 32.

7—The best way to cut down the size of a spring is to remove alternate leaves starting with the short leaf at the bottom.

8—If the cylinder is carefully washed with gasoline all of the compound can be removed with the possible exception of a very small amount that will remain in the pores of the metal. There is no danger of excessive wear because of the compound that remains.

1—The average pressure recommended by the manufacturers for cord tires is about 15 lb. per inch and for fabrics about 20 lb. per inch.

2—Cord tires are usually inflated about 20 per cent less than fabrics.

3—It is always advisable to inflate the tires according to the recommendations of the tire manufacturers. However, we know of cases where the cord tires have been kept underinflated and very good results obtained. The fabric did not break down and the tires gave very good mileage.

4—If the tire is underinflated the car will probably ride a little easier but there are no particular advantages to be gained.

GASOLINE CONSUMPTION

Q—Have you an official record in regard to the amount of gasolene used in an automobile with all conditions the same except the speed. For instance: take an automobile and run it 40 miles in one hour and then run it the same 40 miles in two hours, all conditions being the same. Which run will take the most gasolene?—C. J. McAulay, Haskell, Okla.

1—We have no official records to refer to in answering this question but we believe that the horsepower curve, together with the fuel consumption curves shown in Fig. 7 will help to answer your question. In the first place we must consider that the car will run at a speed of 40 m.p.h. and in the second case, the speed will be 20 m.p.h. Let us assume that the gear ratio of the car is 4 to 1 and that the tire size is 32-in. Under these conditions, at 40 m.p.h. the engine is revolving 1,650 r.p.m. and at 20 m.p.h., 825 r.p.m. At 20 m.p.h. it is very probable that the engine will be operating under quarter load only. Therefore, its rate of fuel consumption from the curve will be .9 lbs. gasolene per hp. per hour and at 40 m.p.h., or an engine speed of 1,650 r.p.m., reading on the full load fuel consumption curve the fuel consumed is approximately .7 lbs. per hp. per hour.

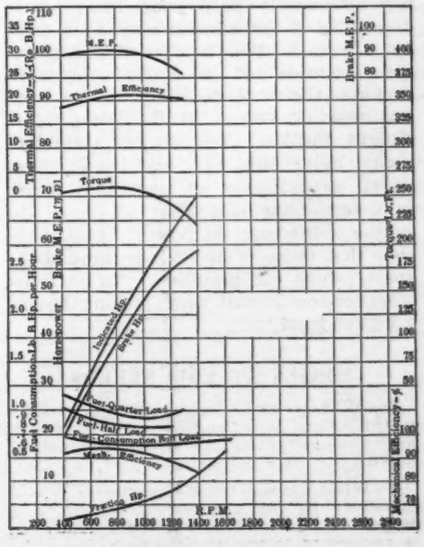


Fig. 6—Power curve of the Dort engine

Fig. 7—Horsepower and fuel consumption curves

TRANSMISSION LEAKS

Q—Trouble has been experienced with a 1919 Grant due to oil leakage around the shaft between the clutch and transmission. Explain how the oil leakage can be stopped.

The trouble is evidently due to poor condition of the oil retaining washers. To remove the oil retaining washers in the transmission it is necessary to first disconnect the clutch from the engine; second, remove the clutch from the shaft; third, remove the clutch shaft which can be accomplished by removing the front bearing cage. After this has been done it is an easy matter to replace the oil washer in the bearing cage.

WORN THRUST BEARING

Q—The clutch in a 1917 Dodge Brothers car slides back and forth about 1½ in. It releases all right and does not slip. The pedal comes quite close to the foot board and the clutch plates are out to the end of the disk pins when it is thrown out. What is the cause of this?—R. D. Cadwallader, Hickory Corners, Mich.

The end play is probably due to a worn thrust bearing on the clutch shaft. In order to correct the trouble it will be necessary to disassemble the clutch, replace the bearing or insert a washer. As long as the clutch releases correctly and does not slip under heavy pull we do not believe it advisable to make any adjustments. In order to do the job correctly it will cost about $20.

TIRE PRESSURES

Q—How much air should be carried in 32 by 4 cord tires on a machine weighing 3,550 lb., without passengers?

2—Should cord tires be inflated to the same extent as fabric tires of the same size?

3—Is a cord tire less apt to be cut and injured by stones or any hard object over which it may be driven when inflated somewhat less than the manufacturer recommends?

4—What advantage is gained by carrying 20 per cent less pressure than the tire manufacturer recommends?—Chas. G. Smith, Red Bud, Ill.

ENGINES

PISTON SLAP

Q—What causes a knock in a Dodge Brothers engine which is free from carbon and is satisfactory in every other way? Retarding the spark does not seem to effect the knock and the engine does not overheat. Could this be a fuel knock? Would a clogged muffler cause this?

2—Will a 1917 carbureter handle the present day fuel?—R. D. Cadwallader, Hickory Corners, Mich.

1—It is possible that the knock referred to is caused by the fuel but we are inclined to believe that it is piston slap or a bearing knock. If the bearings have been taken up and there is slight piston wear or a loose wrist pin the knock is apt to be quite pronounced. A clogged muffler would not be apt to cause the knock described.

2—A 1917 carbureter will handle the present fuel but not as efficiently as some of the newly designed carbureters. Besides the change in carbureter construction there has been considerable change in manifold design to assist in getting the best possible efficiency.

ENGINE WORK ON STEARNS

Q—The power on a Stearns-Knight, light 4, 1918 model is short and the compression is poor. This engine has had new piston rings within the last year and seems to be in good condition in every way. The ignition timing is correct. The valve timing is: Inlet opens 13 deg. after top center, inlet closes 55½ deg. after bottom center, exhaust opens 64½ deg. before bottom center, exhaust closes 2 deg. after top center. Is there any way this timing can be changed so the power of the engine may be increased? What can be done to increase the compression in the cylinders?—Jas. Reynolds, Peoria, Ill.

We do not advise you to change the timing of your engine in order to secure better performance. Better leave the timing as it is and go after the compression in the cylinders. New rings will not necessarily help your compression especially if the sleeves may be a trifle out of round. This is a job that requires the attention of a skilled mechanic because the average shop is not well equipped or versed in the handling of Knight engines. You do not state how many miles this car has been driven which naturally is an important factor in determining just what to do to the engine to increase the power. Also, make sure that there is no leakage around the spark plugs, or manifold. To increase compression install new pistons having a higher head.

MISSES AT LOW SPEEDS

Q—What remedy would you suggest for a 1917 Ford, the engine of which will not run regularly at speeds below 15 m.p.h.?

2—What causes 1 and sometimes 2 or 3 cylinders to cut out in succession on a Model 80 Overland when under load? It is necessary to use the choke to keep the engine running under these conditions and the spark must be fully retarded to avoid knocking. The engine is in good mechanical condition.—F. X. Witt, Jr., Metamora, Ohio.

There may be one or more things responsible for the fact that the engine will not run regularly below fifteen miles per hour. For one thing, your timer may be worn, or there may be loose connections in the ignition system. If this car is equipped with the regular Ford ignition system the trouble may be due to one or more of the coils being out of adjustment. It is also possible that the valves need regrinding or adjusting.

Present Fuel Heavy

We do not know how far this car has traveled but, on a 1917 model if it has been driven continuously it is pretty safe to predict that the valve stem guides have become worn so that they allow air to leak into the combustion chambers and upset the carburetion. Naturally at high speeds this high air is not an objectional factor, but it will prevent an engine from running regularly at low throttle speeds.

Another important factor in making an engine perform well at low speeds is to have the correct opening or gap in the spark plug electrodes. Of course the plugs must be clean to get good performance. Then again an engine must have proper compression to fire regularly at low speeds. Poor compression may be caused by worn cylinders and rings, poor seating valves, leaky joints at the manifold, or loose fitting spark plugs.

Perhaps you have a heated manifold on your car which may be of such a design that it gets too much heat at low speeds and affects the mixture. There have been many of these manifolds brought out for Fords some quite excellent products while others were but short lived. There is on the market the hot spot of the replacement type which is said to be giving excellent results on Ford engines.

Correct Spark Gap

Last but not least you must remember that our engines of a few years ago are not capable of handling present day gasoline as well as the more modern engines. The heavy fuel we get today is very hard to vaporize and one of the most essential things in carburetion nowadays is to get plenty of heat to the fuel, but this should not be done in such a way that the mixture is heated so much that the volumetric efficiency of the engine is impared.

2—Your trouble is probably caused either from poor ignition or a choked fuel line. The remedy for a choked fuel line is obvious. Regarding the ignition better examine the contact points in the breaker and also the brush of the distributer. If the points in the breaker are pitted it will cause them to stick and when they do this certain cylinders will not fire because the circuit is not broken and no spark occurs in the cylinder.

The fact that you have to pull out your choke to keep the engine running may mean that there is a faint spark produced due to the rough contact points but which is not strong enough to fire the mixture unless it is enriched by pulling out the choke. The reason is simple, the gasoline is not as volatile as it used to be and to get sufficient volatility you have to introduce a greater amount into the combustion chamber. With a strong spark this is not so necessary.

ENGINE GALLOPS

Q—Is a new carburetor advisable on a 1916 Pathfinder? With the present one, a Schebler, the engine gallops at speeds below 18 m.p.h. I am thinking of putting on a Stromberg or Rayfield. The car has been overhauled, new rings installed, cylinders cleaned, valves ground, etc. Have driven the car 18,000 miles.—E. Hamick, Chicago.

It would be advisable to install a new carbureter as better efficiency can be obtained. The galloping is probably due to poor carbureter adjustment and possibly the valve stems are worn so as to permit air to enter through them. This irregular running may also be due to improper adjustment of the valves. If they are set up too tight they will be held open when the engine heats up and this would cause irregular action.

REMOVING PISTON PINS

Editor MOTOR AGE.—The piston pins on all Buick cars since 1917, are held in by a 3/16-in. cotter pin which is very hard to get out. To facilitate this, take a piece of 7/16-in. round steel 8 in. long and drill a 3/16-in. hole in it ¼ in. from the end. Then on both sides, where the hole starts, saw down ⅛ in. and cut these little blocks out. You then have two prongs which should be beveled, as shown in Fig. 17. Then saw down the center 2 in. and case harden the tips.

Take a 7/16-in. die, standard thread, and cut a thread down 6 in. from the opposite end from which you have been working. Get a nut and put two 3/16-in. handles on it so it can be easily turned. Get a piece of pipe 4¼ in. long and drill a 7/16-in. hole in it. Slip this over the tool. Set the tool on top of the cotter pin and tap it with a hammer which will cause it to catch the cotter pin. Then slip the pipe down against the piston boss; the pipe will act as a spacer to screw the nut down on and also keep the tool from spreading. Screw the nut down and it will pull the cotter pin out. Creed Blevins, Paris, Texas.

INSTALLING CAMSHAFT BEARING

Q—How can a new front camshaft bearing be installed in a 1916 Grant 6 engine?—Fred Cork, Des Moines, Iowa.

To install a new front camshaft bearing, first remove the front end of the engine from the frame and then remove the gear case cover. After this is done, the camshaft with the gear attached can be easily taken out after the tappets have been removed. The new bushings can then be installed.

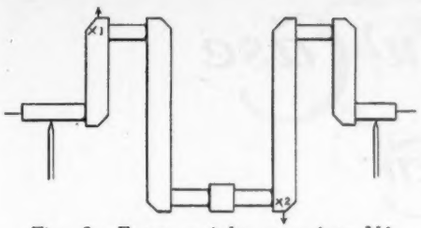


Fig. 8—Extra weight at points X1 and X2 will not necessarily cause the shaft to be out of balance when it is in a position of rest. If these heavier portions are strictly opposed to each other the shaft will be in static balance but will not be in dynamic balance

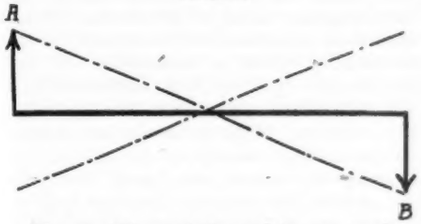


Fig. 9—The unbalanced forces at A and B will tend to create a teetering action as indicated by the dotted lines

BATTERY SULPHATION

Q—Is there any method of determining whether or not a battery is sulphated? Is the charge and test method necessary. —F. T. Hill, Baltimore, Md.

1—It is well to inquire into the nature of a battery by first determining its age and, if possible, the manner in which the driver has operated the car. Notice also the charging rate of the generator, then couple these significant facts with the information secured by testing the gravity of the various cells and by finding the discharge under a high current flow. If the battery is rather old and the car is driven fast and mostly in the daytime, the specific gravity a little low and the voltage under a heavy discharge low, then it is very probable that the plates are sulphated.

When a battery is placed on charge and it is found that its specific gravity comes up very slowly it is a sign that the plates are sulphated. The finding of such a condition necessitates that the charging rate be cut down to a very low point and the battery allowed to charge very slowly for a long period of time. In this manner the sulphation is changed back to lead peroxide in the positive plate and sponge lead in the negative plate.

STATIC AND DYNAMIC BALANCE

Q—What is static balance? How is it obtained?

2—What is dynamic balance? How arrived at?—F. T. Hill, Baltimore, Md.

1—Static balance is a balance at rest. When we speak of crankshaft being in static balance we mean that the shaft will assume a balanced position or one of stable equilibrium while it is at rest. Static balance is obtained by swinging the object on its centers and allowing it to assume its natural position of repose. If it is found that the object assumes one certain position invariably then the object is not in balance but if the heavier side is planed off until the object assumes a position of balance in any plane, then it is statically balanced.

2—Dynamic balance is a balance obtained while the object is in motion. Again referring to crankshafts, the shaft will be in dynamic balance when no vibratory forces are set up at any rotative speeds. We believe it will be perfectly plain from this that a shaft might be in static balance but not be in dynamic balance, for, let us assume a shaft for a four-cylinder engine such as is shown in Fig. 8. The shaft being constructed very heavily of good steel will have very little flexibility and none that could be measured while in a position of rest.

The web at position X1 might be very much out of balance and this could easily be compensated for by a like weight at position X_2 on an adjacent web. This shaft could easily be put in static balance notwithstanding the fact that the weights of the webs were not in balance. Now let us assume that the shaft is rotated at a very high speed. The weights at X_1 will tend to fly directly away from the shaft and X_2 will also tend to fly out. The result is that we have an unequal balance set up such as is shown in Fig. 9. It will readily be seen that these forces A and B will tend to create a teetering action such as is indicated by the dotted lines.

A dynamic balance on a shaft may be obtained by special machines that are made to measure the vibratory forces and the out of balance that is created by these forces. This effect may be pictured by imagining a shaft suspended on a cord and revolved. If there is an out of balance the shaft will first revolve in a teetering manner but, as soon as its critical speed is reached, the teetering action will be transformed into a revolving action which allows the shaft to assume a new gyratory center. By placing a marker against the various positions of the shaft in this new revolving position the shaft will be marked on its light side. Portions may then be ground off to compensate for this out of balance.

HOW THE ELECTRIC SYSTEM WORKS
ARTICLE 5

(Continued from page 33)

charge to the battery, the connection of the battery to the generator serving to maintain the field voltage at a nearly constant value. The cut out switch which by magnet action connects and disconnects the battery and generator, will be taken up in next week's article.

To understand the automobile generator, and the reason for the control systems in use today, it is practically necessary to have a fair idea of the action of the storage battery, which stores the energy supplied by the generator, and gives it out again when needed by the starter, lights or horn. You may at some time have been given the impression that a battery stores electricity, but this is not the case, as the passage of electricity through the battery merely changes the chemical nature of the battery plates, and when current is allowed to flow from the battery the plates change back again.

Assume for a minute that when we burn a board and produce heat, that it would be possible to collect the smoke, ashes, etc., and by applying heat to them recover the board again. This in a sense illustrates the action that occurs in the battery, for we have two sets of plates, one the positive made of lead oxide and the other the negative made of spongy lead, and we merely allow these to "burn" or be affected and changed by the sulphuric acid in which they are placed. In discharging, the material on both sets of plates changes to lead sulphate and at the same time the cell shows a difference of about two volts, which difference is used to send a current to some outside circuit.

To reverse this discharge action which changes the plates into lead sulphate, it is necessary to send current through the battery in the reverse direction from the way it flows when lighting the lamps or operating the starter. This drives the sulphate out of the plates, and restores them to their original condition. From the above action it is easy to see that on discharge the acid in the battery will become thinner and more like clear water, as the heavy portion is absorbed by the plates, and that conversely as the plates charge up and the acid is driven out the solution will again become heavy, and as objects float higher in a heavy liquid than in a light one, it is possible to tell the condition of charge of a battery, by the height that an object floats in the liquid or electrolyte.

A hydrometer, is therefore, one of the best ways of checking the condition of charge of a battery, for it draws up a sample of the acid from a cell and allows a bulb of glass to float in the liquid, and by marks on the float, it is possible to read the heaviness or gravity of the acid. The hydrometer reading for a fully charged battery should be about 1280 which means that the acid is one and twenty-eighth hundredths as heavy as water, and when the battery has discharged until the gravity is down to 1150 it is considered advisable to stop and have the battery recharged.

From the generator standpoint, another condition is perhaps more important than the change in gravity, for a discharged battery will maintain a voltage of about six while being charged, even when taking an abnormally heavy current, while a battery that is in a charged condition, even if showing a voltage of but six, will immediately rise to about 7.5 volts as soon as the generator begins to pump current into it. Either a charged or discharged battery, however, acts fairly well as a sort of reservoir into which the generator pours whatever current it generates that is not required by the ignition or lamps, and it is this property of the storage battery that makes satisfactory operation of the electrical system possible, for without the battery, the generator voltage would vary with every change in car speed, burning out the lights at high speed, and causing them to be dim when going slowly.

(ARTICLE VI NEXT WEEK.)

The Accessory Show Case

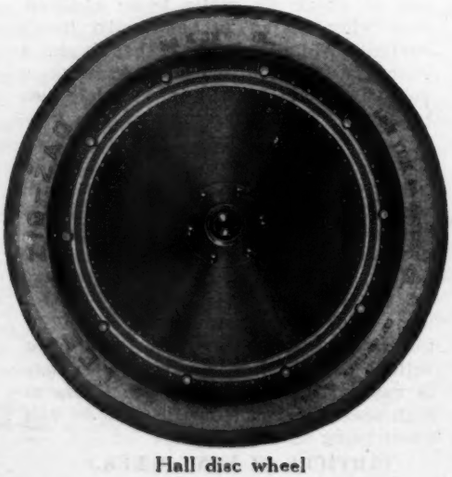
New Fitments for the Car

Clutch Pulley

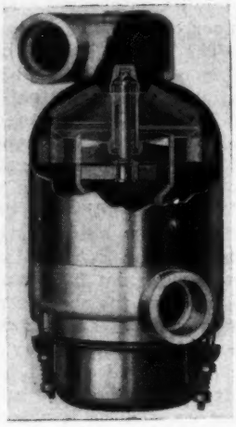
Although designed particularly for tractor and gas engine equipment, these pulleys are for machinery of all kinds where a friction clutch can be used. Attachment to the shaft can be made without dissembling the pulley. All that is necessary is to remove plug in hub and tighten the set screw underneath and after replacing the plug the pulley is ready to operate. The special design of this friction clutch pulley makes it possible to equip it with any number of friction plates, thus giving any amount of pulling power required. All working parts are thoroughly lubricated at all times. After the pulley is fastened to the shaft, lubricating oil is injected into the interior of the pulley which permits the friction plates and all working parts to run in oil while idling. Spiral oil grooves in the hub cause the oil to be thoroughly distributed over the entire bearing at all times. No wood or fibre is used on the construction. The illustration shows a clutch pulley for a stub shaft. The same type can be obtained for line shaft. Menasha Clutch Pulley & Machinery Co., Menasha, Wis.

Hall Flexible Wheel

Any car can be equipped with Hall fabric disc wheels without the necessity of changing hubs or using special parts, and the tread of the car is not changed. They are equipped with demountable rims and are claimed not to collapse when a car skids or hits a curb or deep rut. Shocks and vibrations are absorbed within the wheel by means of the fabric disc construction made of several layers of high grade cotton duck, thoroughly vulcanized. These wheels are made in three sizes, 30 in., 32 in. and 34 in. with standard straight side or clincher rims. A set of these wheels can be applied using the same tires already on the car. Hall Syndicate, Inc., 1310 Commonwealth Building, Philadelphia.



Hall disc wheel

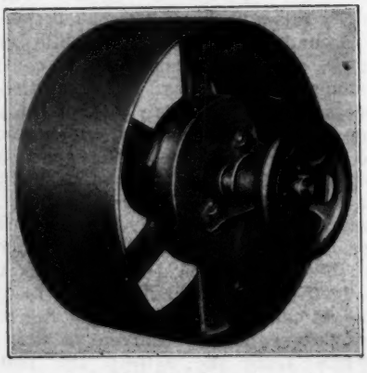


United air cleaner

Victor Battery Box

A new Victor battery box for Fords has been designed to protect the storage battery from dust, dirt, oils and water It fits over the battery outside of the hanger and it is not necessary to remove the battery or disconnect the terminals to install. It is made of drawn japanned metal. The Corcoran-Victor Co., Cincinnati, Ohio.

Victor battery box



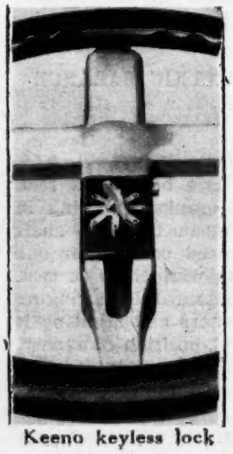
Menasha clutch pulley

United Air Cleaner

This is an automatic device for affording an escape from the destructive effects of dust. Attached ahead of the carburetor, all air entering the engine is first subjected to an extreme centrifugal action as a result of which all foreign matter is separated from the air stream and collected in a receptacle. It embodies an entirely new application of the centrifugal principles as applied to air cleaners. This cleaner is not limited to the initial velocity of the air as the velocity is greatly increased after the air enters the cleaning chamber and the vortex set up by the rotor. The air is taken in at the top of the cleaner horizontally, passing over the rapidly revolving rotor. This rotor turns up under full load of the engine at approximately 6,000 to 7,000 r.p.m. The fins on the top and lip of the rotor set up a very high rate of centrifugal action to which the air is subjected as it passes over the rotor. This centrifugal action throws the dust to the inside wall of the cleaner where it is whirled rapidly and deposited in the dust pan at the bottom of the cleaner. United Mfg. & Distributing Co., Chicago.

Steering Wheel Lock

The elimination of keys is the distinct advantage claimed for the Keeno lock. It consists of a steering wheel, appropriate for any car, on one of the spokes of which is a radial dial consisting of eight raised and numbered ribs. Fitting over this is the indicator bar and on the side of the spoke is the release button. To lock the wheel a button is pressed and the indicator bar turned, freeing the wheel. To unlock, the indicator bar is turned to the proper positions and the wheel connected for steering. It can be easily operated in the dark as the ribs are sufficiently raised so that their position can be felt. The wheel is 17 in. with an aluminum spider and corrugated mahogany-finished rim and is claimed to be just as solid and secure as any factory - installed wheel. Price complete, $27.50. Keeno Keyless Lock Co., 2037 S. Wabash avenue, Chicago.



Keeno keyless lock

Service Equipment
Time Savers for the Shop

Brewer Spark Plug Cleaner

Cleaning spark plugs in a minimum of time is the purpose of this new device for speeding up repairshop operations. Compressed air is applied at the bottom of the funnel by a permanent attachment with lever control and the spark plug is inserted in the revolving top which is arranged to take all sizes of spark plugs. As shown in the illustration a small nozzle extends up from the bottom allowing the entrance of the compressed air. This nozzle, up to within ½ in. of its top, is surrounded with silica (sand) which is set in motion when the air is applied. The spark plug itself, extending down through the top, is cleaned almost instantly by the action of the compressed air and sand. List price $12, finished in black enamel. Brewer Specialty Corp., 2453 Wabash avenue, Chicago.

Steam Curing Bag

As shown in the illustration, this steam curing bag is used inside the casing like an air bag. It is an inside vulcanizer and takes the place of iron steam cores, enabling the repairman to cure the inside of the tire at the same time the outside cure is made in the mold and in the same operation. The permanent parts of this steam bag, including everything except the jacket, are made of metal and are claimed to last indefinitely. No expansion is lost at the ends of the bags as the ends are united by a flexible connection which is hidden by the elastic curing jacket. All pressure is therefore cross-sectional. These steam

Steam curing bag

curing bags are also made in sizes capable of handling 6, 7 and 8 in. pneumatic truck tires. A 3 in. bag costs $18 and 350 cures are guaranteed before rejacketing is necessary. Prices vary according to the size desired, the largest size, 8 in. being priced at $50. The Steam Bag Corp., 1545-47 Broadway, Denver, Colo.

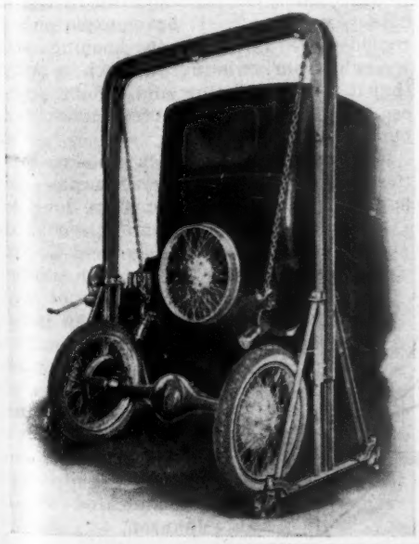
Portable Electric Tester

Direct reading instruments for general testing purposes, known as the Type PX portable instruments are manufactured by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The movements are made very light, assuring minimum pivot and jewel wear and no injurious effects from shock or vibration. The cases are made of moulded composition which is claimed to be exceedingly strong and acid resisting. The complete movement is mounted as a unit and is readily removed for repairs by taking off the cover and removing the four corner posts. This releases the sub-base upon which all parts are assembled.

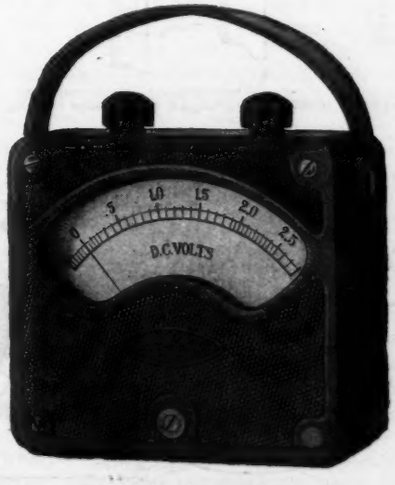
Weaver Automobile Hoist

A piece of service equipment which is essential in every service station is a hoist that will give real service. The hoist shown in the illustration occupies very little space, is of sturdy construction and possesses features which make its application almost universal. The telescoping frame can be elevated from a minimum height of 7 ft. 6 in. to a maximum height of 9 ft. 2 in. by means of its own power. This frame can be set low enough for the hoist to pass through the average door or it can be elevated sufficiently to raise the rear end of a limousine or delivery truck, or to lift closed bodies free from the chassis and transport them to other parts of the shop.

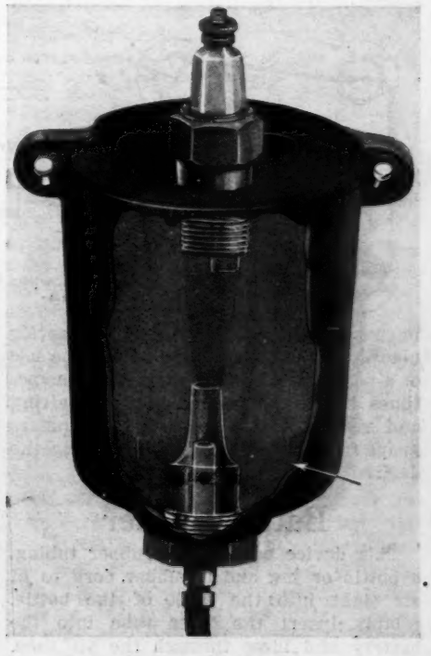
The hoisting mechanism is of the well known worm drive type. The hoist is constructed primarily of heavy 5 in. channel steel with the arch reinforced on either side by heavy steel plates ⅜ by 4 in. The lifting chains are heavy and are carefully tested to a strain in excess of the recommended capacity of the hoist. The castors are 5 in. in diameter and full roller bearing. The castor spindles revolve on two sets of ball bearings. The lifting leverage is 200 to 1. The width between frames is 6 ft. 4 in. Details regarding prices can be obtained from the Weaver Mfg. Co., Springfield, Illinois.



Weaver automobile hoist



Portable electric tester



Spark plug cleaner

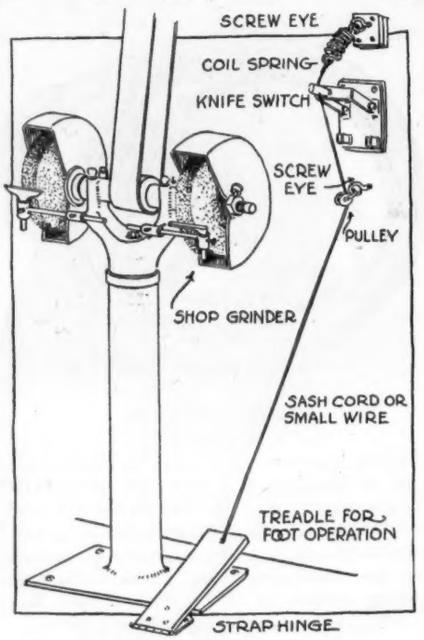
The Automotive Repair Shop

Practical Maintenance Hints

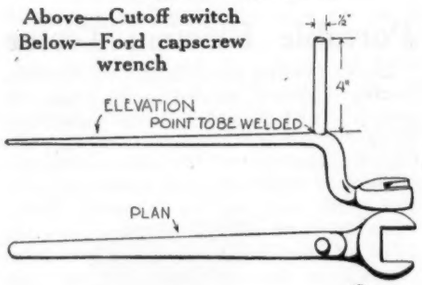
Cutoff Switch for the Shop Grinder

To avoid unnecessary running of the shop grinder with the consequent waste in electric energy and corresponding charges for the current, a switch arranged as shown in the drawing is simple to apply and stops the running of the grinder when a tool or other part is not being ground. This consists of a knife type switch, the usual type as in circuit with the motor, held out of contact by means of a coil spring.

A piece of sash cord or small wire leads from the blade of the switch to a pulley and treadle fixed to the floor near the base of the grinder. This treadle is positioned convenient for the person using the grinder to place one foot on it while holding the tool against the wheel. Immediately the operator steps back the coil spring pulls the blade out of contact and stops the wheel. This fixture will rapidly pay for itself in saving of current.

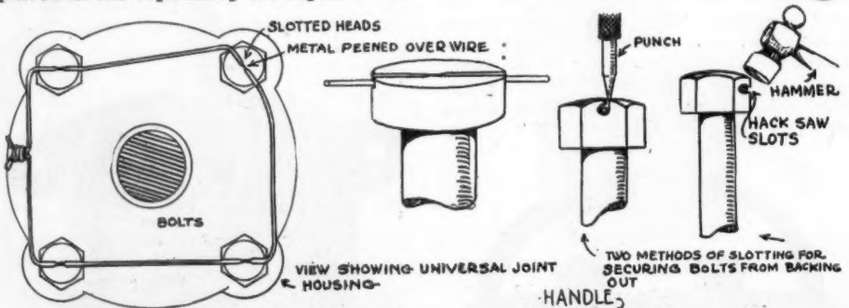


Above—Cutoff switch
Below—Ford capscrew wrench



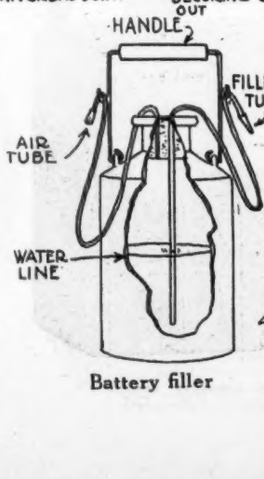
Identification Marking for Tubes and Tires

A simple means of marking a tube or tire casing for purposes of identification is by means of an indelible pencil. The tube is marked by wetting a spot and applying the pencil to the surface. The tire casing is marked similarly on the inside. The owner's name in his handwriting avoids disputes where these are placed in the repairshop for repairs. For purposes of the repairman numerals placed on the tube or tire avoids the use of a separate detachable tag which sometimes becomes detached while repairing and results with dissatisfied customers apart from the confusion in locating the desired tire or tube.



Battery Filler

This device consists of rubber tubing, a bottle or jug and a rubber cork to fit air tight into the neck of the bottle. Simply insert the filler tube into the battery and blow through the air tube. When the desired height is reached, pinch the filler tube, stop the water and insert into the next cell. Hang up the tube ends or handle the wire by a hook, or leave a loop in the wire and push the tubes through. To fill, insert the filler tube in the water jar and set it a little lower, allowing the bottle to fill by syphonic action.



Battery filler

Securing Capscrews With Wire

Cap screws used on ring gears, differential joint cases, starter and generator brackets, etc., will invariably work loose unless these are wired to prevent them backing out. To drill a hole with a small drill through the heads of cap screws is tedious and invariably results in broken drills unless a jig is used. To avoid drilling and yet obtain a satisfactory method of locking, either a slot through the side of a hexagonal head screw or on the top of a hexed head can be made with a hacksaw in a short time. A wire is then placed through these slots and the head closed down on it with a punch or a hammer. With screws having a screw driver slot no slotting is required. Simply let the wire into the slot and peen the center of the slot down on the wire. This makes a secure job and avoids the possibility of these screws working out and causing trouble due to neglect to secure them.

Using Ford Capscrew Wrench

Editor MOTOR AGE—The following may be of some use to repairshops doing Ford repairing:

When using the regular Ford flywheel, capscrew wrench, I have experienced considerable difficulty in keeping the wrench from twisting in such a way that it was a very slow and tedious process, especially after the screws have been cut several times.

This can be done much quicker and the screws set up closer, if a piece of half inch steel rod about 4 in. long is welded to the wrench as shown here. This rod can be securely held in one hand while using the wrench, thereby preventing all tendency of the wrench to twist up off the screw head. It not only makes the work easier, but also protects both capscrew head and wrench from being mutilated, besides saving considerable skin on the mechanic's knuckles.—E. L. Johnson.

Law in Your Business

By Wellington Gustin

At Your Service

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty points as may be submitted to him.

Collateral Note Defined

Over a year ago we accepted a $50 registered liberty bond from a customer on his account and had our bank send it to Washington for transfer of title. Through an oversight we were not given a receipt for the bond and we neglected to note the number of the bond. What recourse have we now when the banker seems reluctant to look up his records and give us the number? What is a collateral note and when does it terminate? A year ago we held a customer's note for $500 and when we requested our bank to buy it they did so but required that we give them our $500 note as collateral, which we did, the customer being a landowner. The farmer's note carried 7 per cent interest and was for one year. At the time of purchase, the bank paid us the accrued interest. Our note was for six months and at 7 per cent. Recently we paid six months' interest and were required to give a new note for the amount of $500. When we sold and delivered the farmer's $500 note the bank obtained the claim on the interest. Now, how can we avoid paying interest on the collateral?—J. A. Morling & Son, Cameron, Ill.

The banker is responsible for any negligence on his part in handling of the bond and an action would lie against him where you can show he has been negligent in the matter. In such an action you could at least gain the information you desire from the bank.

A collateral note is a note given as security for another debt, and in the phraseology of banks, means a "note" security additional to the personal obligation of the borrower. Such collateral security is not received in payment of the principal debt and is not an additional right to which the creditor is absolutely entitled, but is merely a concurrent security for another debt, subsidiary to the principal debt, and, if the principal debt be paid off the debtor is entitled to a restoration of the collateral security.

There must be some mistake on the part of your bank in collecting interest on your own note put up as collateral, or if they intend to collect interest from you, they surely do not intend to collect interest and credit to their own account that falling due on the farmer's note. Banks like to collect interest frequently so that the interest may be put out at interest, and therefore your bank may have used this means of collecting from you rather than waiting until the end of the year on the farmer's note.

Certainly the bank is not entitled to interest on this collateral since they simply hold this as security and have loaned you no money on it. For you to pay interest and the farmer to pay interest would amount to usurious interest on the amount loaned you. Ordinarily a note put up as collateral terminates as such upon payment of the principal debt or obligation, or according to the agreement between the parties.

Conditional Sale Did Not Pass Title

IN the case of the Worcester Morris Plan Co. against Judson C. Mader, the owner of a truck delivered it to one Travers under a written agreement by which title remained in the owner until all the notes given by Travers for the purchase price under the agreement were fully paid. Later the owner gave the Morris company a promissory note for the amount yet due on the Travers notes and assigned to the Morris company as collateral security therefor all the Travers notes then remaining unpaid, together with the conditional sale agreement. The endorsement on the back of the agreement was as follows:

"For value received I hereby assign to the Worcester Morris Plan Co. the within lease and claim and my interest in the property therein described. Chas. W. Wise."

This Assignment Was Not Recorded

Travers died before his notes were all paid, and afterwards Wise, the owner, without knowledge of the Morris company, assignee of the lease and claim from Wise, gave a bill of sale of the truck to the defendant, Mader, and delivered it to him. Default in payment having been made in the notes held by the Morris company this company demanded possession of the truck, which was refused. The question presented was whether the assignment from the owner, Wise to the Morris company should have been recorded according to the Massachusetts statute.

Right of Recovery on Contract Deposits

We have up with two manufacturers deposits on contracts which were out Jan. 1. One of these parties claims that we placed an order with them which was never shipped. Have they a right to deduct or hold our deposit?—Mississippi Automobile Co., Tupelo, Miss.

Your rights to recover the deposits depend on the terms of the contracts with the manufacturers. In all ordinary contracts, the one who breaches the contract must pay all damages occasioned thereby. If the deposit is required as a fund out of which these damages may be made good, then where you are at fault you would be entitled to receive back only that part of the deposit over and above the damages occasioned to the manufacturer. What these damages are, is most always a matter of dispute between the parties to an agreement.

Therefore, parties to a contract often attempt to settle this matter of damages in advance, by agreement in the contract that it shall be a definite, specific amount. In contracts of the nature you mention, this is named as being the amount of the deposit required in the contract. If the damages are unliquidated that is, uncertain and unknown in amount, and the deposit required is not excessive or is in the neighborhood of the probable amount the manufacturer may retain the whole of the deposit upon breach of the buyer.

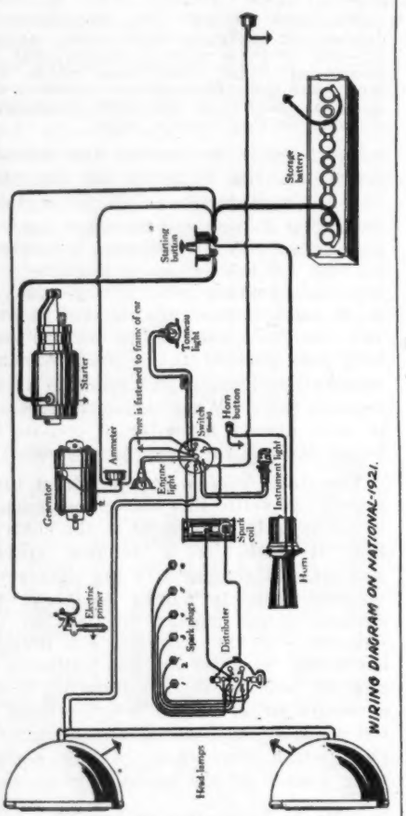
Penalty in Proportion to Deposit

However, if the deposit is out of proportion to the actual damage done to the manufacturer, a court will order a return of the deposit, or a proportionate amount thereof, regardless of the agreement that it is to be applied in satisfaction of a breach of the contract by the buyer.

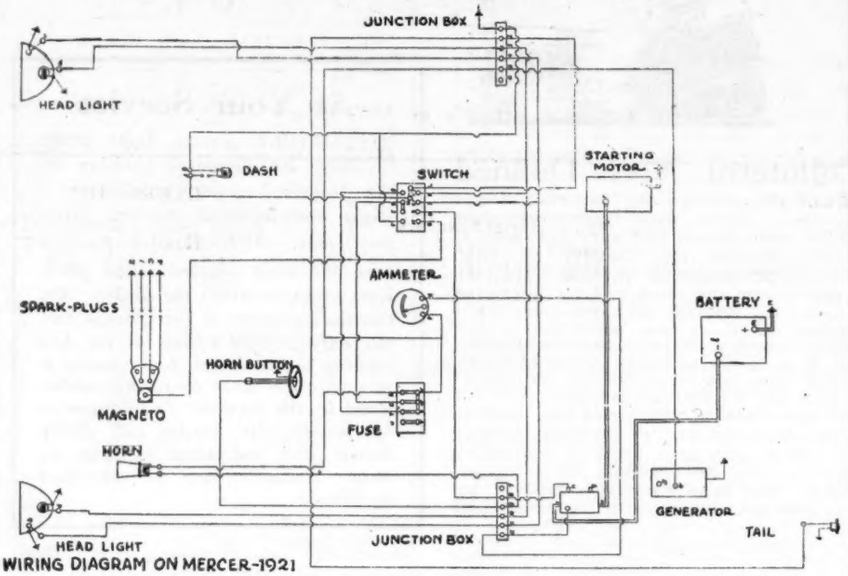
Penalties are not favored in the law and courts will not uphold an agreement wherein the amount named as satisfaction for a breach thereof is out of proportion to the actual damages. These are fundamental principles applying to all such contracts. Of course, if you were not responsible for the failure to ship the one automobile in question, you would not be the party in default and the manufacturer could not lawfully hold your deposit. In either case, considering the principles as stated above, the deposits may not be withheld except you be in default on the contracts and then only to the extent indicated.

Motor Age Weekly Wiring Chart No. 127

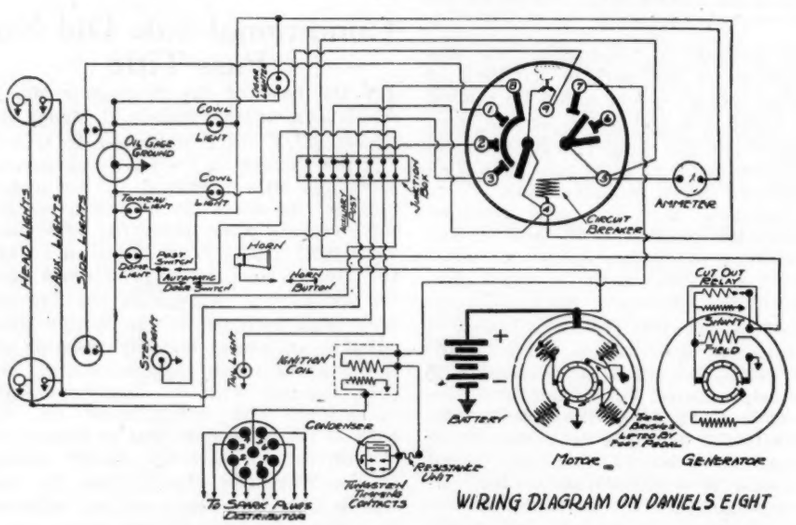
1921 National Westinghouse System



1921 Mercer—Westinghouse System



1921 Daniels Eight—Delco System



Name of Car and Date on Which Wiring Diagrams Have Appeared in Previous Issues

Allen—Sept. 30, '20
American Beauty—Feb. 17, '21
Buick—Dec. 23, '20
Cadillac—Nov. 18, '20
Case—Oct. 7, '20; Feb. 17, '21
Chalmers—Feb. 24, '21
Cleveland—Feb. 24, '21
Cole—Jan. 20, '21; May 5, '21
Daniels—Feb. 17, '21
Dorris—Dec. 9, '20; Feb. 24. '21
Elcar—Oct. 28, '20 Dec. 2, '20
Elgin—Oct. 14, '20
Elkhart—March 3, '20
Franklin—Dec. 2, '20
Gardner—April 14, '21
Grant—Nov. 25, '20; March 31, '21
Hudson—Jan. 13, '21 March 17, '21
Hupmobile—Feb. 3, '21 April 14, '21
Jackson—March 17, '21
Jordan—March 10, '21
King—March 3, '21
Kissel—Oct. 21, '20 Apr. 28, '21
Klinekar—April 14, '21
Lexington—Dec. 16, '20
Locomobile—May 5, '21
McFarland—March 24, '21
Mercer—March 24, '21
Mitchell—Jan. 6, '21; Apr. 21, '21
Moore—Nov. 11, '20
Moline-Knight—Nov. 4, '20
Monitor—March 31, '21
National—Dec. 16, '20 March 10, '21
Oakland—March 24, '21
Oldsmobile—Apr. 21, '21 April 28, '21
Packard—Oct. 7, '20 March 31, '21
Paige—March 10, '21
Peerless—Nov. 18, '20 March 3, '21
Pierce-Arrow—April 21, '21
Premier—Feb. 10, '21
Reo—Feb. 10. '21
Roamer—Dec. 30, '20 Feb. 10, '21
Saxon—Oct. 21, '20 Dec. 30, '20
Scripps-Booth—Feb. 3, '21
Sheridan—Feb. 3, '21
Stearns—Nov. 4, '20 Jan. 13, '21; May 5, '21
Stephens—Sept. 16, '20
Studebaker—Oct. 29, '20
Templar—April 28, '21
Velie—Jan. 20, '21
Willys-Knight—Oct. 14, '20

Additional Wiring Diagrams May Be Found in the Readers' Clearing House in This Issue

Passenger Car Serial Numbers

Motor Age Maintenance Data Sheet No. 149

One of a series of weekly pages of information valuable to service men and dealers—save this page

NELSON

Year	Model	Cyls.	Price	Serial Numbers
1917	A	4	$1800	1001-1082
	BB	4	1290	1004-1125
	C	4	1400	1059-1101
1918	D	4	1450	1112-1187
1919	D	4	1500	1188 up
1920	D	4	1700	

Number on dash plate; engine number top of right front crankcase arm.

OAKLAND

Year	Model	Cyls.	Price	Serial Numbers
1912	30	4	$1200	7001-8000 11001-11500
	40	4	1450	8001-9000 9650-11000
	45	4	2100	9001-9500
1913	35	4	1075	35001-37500
	42	4	1600	40001-43601
	60	6	2400	60001-60951
1914	36	4	1200	360000-364000
	48	6	1785	480000-481150
	62	6	2500	620000-620100
1915	37	4	1200	370000-373599
	49	6	1685	490000-490500

Number on front heel board

1916	32	6	795	320000-328000 330000-347100
	38	4	1050	380000-384001
1916-17	50	8	1585	500000-502000

Number on heel board of driver's compartment, or on left rear cross frame member.

1917	34	6	875	134-3000034
1918	34-B	6	.....	3000134 up
1919	34-B	6	.....	11699934
1920	34-C	6	1075	11700134 up

1918 number on heel board; 1919 on heel board and on right rear side member.

OLDSMOBILE

Year	Model	Cyls.	Price	Serial Numbers
1913	40	4	$2500	80325-80999
	53	6	3200	81000-81500
1914	54	6	2975	83000-83999
	42	4	1285	84001-84399
1915	42	4	1285	84500-92499
	55	6	2975	92500-92999
1916	43	4	1095	93000-99999
	43	4	1095	109000-109499
	44	8	1195 1775 1850	109500-118782
1917	45	8	1775 1295 1850 1367	119000-135276
	45	8	1295	143000-144500
		8	.....	148900-148925
	37	6	1095	150000 up
			1675 1295	192000-200000
1918	45A	8	1700	135277-142999
				145000-149999
1919	37A	6	1395	37AT1 & 37AR1 up
			1895	37AS1 & 37AC1 up
	45B	8	1895	45BT1, 45BP1 & 45BS1 up
1920	37A	6	1395	
	45B	8	2045	

Number under front seat cushion or on dash, right side, under hood.

OVERLAND

Year	Model	Cyls.	Price	Serial Numbers
1912	58	4	.....	1-250
	59	4	.....	1-13250
	60	4	.....	1-6656
	61	4	.....	1-2300
1913	69	4	.....	1-26354
	71	4	.....	1-3000
1914	79	4	.....	1-44995
1915	80	4	.....	1-19993
	81	4	.....	1-20399
	82	6	.....	1-2846
1916	84	4	.....	1-14080
	86	6	.....	1-12008
	83 & 83B	4	.....	1-101976
1916-17	75 & 75B	4	.....	1-65693
1917-18	83 B. O. E.	4	.....	
	85-4	4	.....	1-51892
	85-6	6	.....	1-18459
	90 & 90B	4	.....	1

Number under front seat cushion, stamped on front spring right hanger, or front end right side frame rail, except model 90, which is on right rear frame end.

1919	4	4	$845	100-31000
1920	4	4	945	

Number on left frame.

PACKARD

Year	Model	Cyls.	Price	Serial Numbers
1912	30	4	$4200	20001-23000
	48	....	.....	23001-26000
	18	4	3200	26001-27000
1913	48	6	4850	35026-38000
1914	1-38	6	4150	38000-42000
	48	6	4850	50026-52000
	2-38	6	3350	53026-56000
	48	....	.....	63026-66000
1915	3-38	6	3750	75026-76999
	5-48	6	4850	78026-78386
1916	1-25	12	2750	80026-90000
	1-35	12	.....	
	2-25	12	.....	125051-150000
	2-35	12	.....	
1917	2-25	12	3050	
	2-35	12	3500	
1918	3-25	12	3700	150051 up
	3-35	12	4100	
1919	3-25	12	3950	
	3-35	12	4300	
1920	3-25	12	.....	
	3-35	12	.....	

Number on right front frame.

PAIGE

Year	Model	Cyls.	Price	Serial Numbers
1911-12	25	4	$975 1000	3000-4499
1912-13	25	4	975 1000	4500-6999
1913	25	4	975	7000-9170
1914	25	4	975	9171-9999
1913-14	36	4	1275	10001-14000
1914-15	36	4	1075	14000-20000
	46	6	1395	55000-59999
1915-16	36	6	1095	80000-81500
	46	6	1295	60000-66000
1916-18	46	6	1375	65600-69999
	38	6	1090	85000-89923
1917-18	39	....	1330	89924-101999
1918	39	6	1395	102001 up
	39	6	1690	102001 up
1917-18	51	6	1495	70000-74999
	55	6	2060	75000-79500
1919	55	6	2060	82001 up
	55	6	2165	82001 up

Number plate under left front seat cushion

PAN-AMERICAN

Year	Model	Cyls.	Price	Serial Numbers
1918	E-6-48	6	$1800	500-1200

Number on frame horn

1919	E-6-48 F-6-48 G-6-48	6	.....	3000-3322
1920		6	2150	3314 up

Number on cowl plate

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Mak	Cylinders: Bore and Stroke	WB	Tires	2-Pass-	5-Pass.	7-Pass.	Coupe	Sedan
Ace.....G	Guy..	6-3¼x5	123	32x4	$2975	$2975	....	$3680	$3680
Ace.....H	H-S...	6-3⅜x5	123	32x4	2975	2975	....	3680	3680
Ace.....L	H-S...	6-3¼x5	116	32x4	2260	2260	....	....	....
Allen.....Series 43	Own..	4-3½x5	110	32x4	‡1395	1395	....	....	2395
Ambassador.....R	Cont..	12-2⅞x5	136	32x4½	....	†4500	$4500	....	6500
Amco.....1921	H-S...	4-3½x5	114	31x4	....	....	....	....	....
American.....C	H-S.	6-3¼x5	127	32x4	2395	2395	2475	....	3495
Anderson.....Series 40	Cont.	6-3¼x4½	120	33x4	2195	1795	1845	2795	2795
Apperson.....8-21-S	Own..	8-3¼x5	130	34x4½	....	†3500	3500	4500	4500
Apperson...Anniversary	Own..	8-3¼x5	130	34x4½	....	†4250	4250	....	....
Auburn.....6-39	Cont..	6-3¼x4½	120	33x4	1745	1695	†1695	2795	2795
Beggs.....20T	Cont..	6-3½x4½	120	33x4	‡1885	1885	....	2785	2885
Bell.....4-32	H-S...	4-3½x5	114	31x4	....	1495	....	....	....
Bell.....6-50	H-S...	6-3¼x5	124	32x4	....	1695	....	....	....
Birch Super-Four.....	H-S..	4-3½x5	117	33x4	1345	1345.	†1395	2295	2295
Birch Light Four.....	LeR..	4-3½x4½	108	30x3½	1195	1195	....	....	....
Birch Light Six.....	H-S...	6-3¼x5	117	33x4	1695	1695	....	....	....
Bour-Davis.....21S	Cont..	6-3½x5¼	126	33x4½	†2585	†1745	2585	2495	2495
Bour-Davis.....91	Own..	4-4 x5½	125	32x4½	†7900	9000	....	....	10500
Brewster.....4-34	Own..	4-3⅜x5	109	31x4	1285	1285	....	1885	1885
Briscoe.....S-21 A	Own..	2-3½x3⅜	90	28x3	395	....	....	....	....
Brook.....21-44-5-6-7	Own..	6-3⅜x4½	118	33x4§	1795	1795	....	2585	2895
Buick.....21-48-9-50	Own..	6-3⅜x4½	124	34x4½	....	....	2065	2985	3295
Bush.....E.C.4	Lyc...	4-3½x5	....	....	....	1245	....	....	....
Bush.....E.C.6	Rut...	6-3½x5	....	....	....	1575	....	2050	2150
Cadillac.....59	Own..	8-3½x5½	125	34x4½	3790	†3790	....	....	4950
Carroll.....6	Dues..	6-3½x5	132	35x5	....	....	3940	....	5190
Carroll.....6	Dues..	6-3½x5	128	....	3985	3985	....	....	....
Carroll.....V	Cont..	6-3½x5	128	....	3185	3185	....	....	....
Case.....6-30	Own..	6-3½x5¼	126	34x4½	....	†2650	2650	3400	3750
Chalmers.....6-30	Own..	6-3¼x4½	117	32x4	1795	1795	1945	2595	2745
Chalmers.....6-30	Own..	6-3¼x4½	122	33x4½	....	....	1945	....	....
Champion.....Tourist	Lycom	4-3½x5	113	32x3½	....	1250	....	....	....
Champion.....Special	H-S...	4-3½x5	118	32x4	†1595	1595	....	....	....
Chandler.....Six	Own..	6-3½x5	123	33x4	1930	†2010	1930	2930	3030
Chevrolet.....490	Own..	4-3¼x4	102	30x3½	795	820	....	1325	1375
Chevrolet.....FB	Own..	4-3¼x5¼	110	33x4	1320	1345	....	2075	2075
Cleveland.....40	Own..	6-3 x4½	112	32x4	1465	1465	....	2375	2475
Climber Four.....	H-S..	4-3½x5	117	....	1550	1550	....	....	....
Climber Six.....S	H-S..	6-3¼x5	125½	32x4½	2750	2750	....	....	....
Cole.....870	Nort..	8-3½x4½	127	33x5	3250	†3250	3250	4250	4450
Columbia.....D-C&CS	Cont..	6-3¼x4½	115	32x4	1945	1795	1995	2895	2895
Comet.....C-53	Cont..	6-3½x5¼	125	33x4½	....	2350	2450	....	3650
Commonwealth.....44	H-S..	4-3½x5	117	32x4	....	1595	....	....	2465
Crawford.....21-6-40	Cont..	6-3½x5¼	122½	32x4	3000	3000	....	....	4500
Crow-Elkhart....L63-65	Lyc...	4-3½x5	117	32x3½	‡1295	1295	....	....	....
Crow-Elkhart....S63-65	H-S..	6-3¼x5	117	33x4	‡1545	1545	....	....	2395
Cunningham.....V-4	Own..	8-3⅜x5	142	35x5	33x5	....	....	....	....
Daniels.....D-19	Own..	8-3½x5¼	132	34x4½	‡5350	†5350	5350	6250	6950
Davis.....61-67	Cont..	6-3¼x4½	120	33x4	†1995	1895	†2150	2795	2795
Dispatch.....	....	4-3⅜x5	120	34x4	1290	1350	1350	1525	1575
Dixie Flyer.....H-S-70	H-S..	4-3½x5	112	32x4	1595	1595	....	2570	2570
Dodge Brothers.....	Own..	4-3⅞x4½	114	32x3½	1235	1285	....	1900	2150
Dorris.....6-80	Own..	6-4 x5	132	33x5	....	†4785	4785	5800	6690
Dort.....17-12	D-Ly	4-3½x5	108	31x4	1215	1215	....	1865	1995
Dupont.....A	Own..	4-3⅛x5½	124	32x4½	3400	†3400	....	....	4900
Elcar.....7-R	Cont..	6-3¼x4½	117	33x4	‡1795	1795	†1795	2500	2600
Elgin.....K-1	Falls.	6-3½x4¼	118	33x4	†1895	1775	....	2795	2795
Essex.....	Own..	4-3⅝x5	108½	32x4	1595	1595	....	2100	2450
Fergus.....S-5-21	Own..	6-3¼x5	126	32x4½	....	Chassis Price		8500	....
Ferris.....	Cont..	6-3½x5¼	130	32x4½	3350	*3350	....	....	4100
Ford.....T	Own..	4-3⅜x4	100	30x3½	395	440	....	745	795
Franklin.....9-B	Own..	6-3¼x4	115	32x4	2700	2800	†2750	....	3850
Friend.....Four	Own..	4-3½x4½	112	32x3½	1285	1285	....	1985	2085
Globe.....B-10	Supre	4-3⅜x5	115	32x4	....	....	....	....	....
Grant.....Six	Own..	6-3⅛x4½	116	32x4	1550	1550	....	2450	2450
Gardner.....G	Lyc...	4-3½x5	112	32x3½	‡1195	1195	....	....	2145
Halladay.....21	Rut...	6-3⅛x5	116	33x4	....	2285	....	....	....
Handley-Knight.....	Kn'ht.	4-4½x4½	125	32x4½	....	....	2985	....	4185
Hanson Six.....60	Cont..	6-3¼x4½	121	32x4	2185	2185	†2285	....	3165
Hanover Light.....	Own..	2-3½x4	90	28x3	345	....	....	....	....
Harroun.....A-A-2	Own..	4-3¼x5¼	106	30x3½	....	1195	....	....	....
Hatfield.....A-42	H-S..	4-3½x5	115	32x4	1695	1695	....	....	2595
Haynes.....47	Own..	6-3½x5	132	34x4½	3500	†2935	2935	....	4250
Haynes.....50	Own..	6-3½x5	121	33x4	....	1985	....	....	....
Haynes.....48	Own..	12-2⅝x5	132	34x4½	4200	†3635	3635	....	4950
Huffman.....R	Cont..	6-3¼x4½	120	32x4	1795	1795	....	....	2775
H.C.S.....	Weid.	4-3⅝x5½	120	32x4½	2925	†2975	....	3650	....
Holmes.....Series 4	Own..	6-3½x4¼	126	34x4½	†3350	....	3350	4250	4550
Hudson Super 6.....	Own..	6-3½x5	126	34x4½	†2400	....	2400	3275	3400
Hupmobile.....Series R	Own..	4-3¼x5½	112	32x4	1685	1685	....	2725	2800
Jackson.....638	Cont..	6-3¼x4½	121	32x4½	†2685	1950	....	3760	3760
Jordan.....M	Cont..	6-3¼x4½	120	32x4	2250	2250	2475	3300	3300
Kelsey.....GF	Own..	6-3⅛x4¼	118½	32x4	1800	1800	....	2700	2700
Kenworthy.....8-90	Own..	8-3 x5¼	130	32x4½	5000	5000	5250	6000	6000
Kessler.....K	Own..	4-3⅜x3⅜	117	32x4	....	1995	....	....	2445
King.....H	Own..	8-3 x5	120	32x4½	2740	†2725	*2725	....	4035
Kissel.....45	Own..	6-3½x5½	124	32x4½	3475	†3475	2775	4275	4275
Kline Kar.....6-55-K	Cont..	6-3¼x4½	121	33x4	2290	2290	2290	3250	3290
Kurtz Automatic.....A	H-S..	6-3½x5	122	32x4	....	2250	....	....	3000
LaFayette.....134	Own..	8-3½x5¼	132	33x5	5625	5625	5625	7200	7400
Leach.....21-A-B&C	Cont..	6-3½x5¼	128	32x4½	‡5700	5200	5700	....	....
Lexington.....Series S	Cont..	6-3¼x4½	122	32x4	....	2285	....	3250	3350
Lexington.....Series T	Anst..	6-3¼x4½	128	32x4½	....	....	2985	....	4250
Liberty.....10-C	Own..	6-3½x5	117	32x4	1795	1795	†1885	2825	2850
Lincoln.....	Own..	8-3⅜x5	130	33x5	4600	4600	4600	5750	6000
Locomobile.....	Own..	6-4½x5½	142	35x5	....	†8600	$600	....	....
Lone Star.....	Lyc...	4	....	....	....	....	....	....	....
Lorraine.....21-T	H-S..	4-3½x5	114	32x4	1665	1665	....	2590	2590

NAME AND MODEL	Engine Make	Cylinders: Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Maibohm.....B	Own..	6-3½x4¼	116	32x4	‡1575	$1575	†1750	$2395	$2395
Marmon.....34	Own..	6-3⅜x5½	136	32x4½	4185	†3985	3985	4875	5275
Maxwell.....25	Own..	4-3⅝x4½	109	30x3½	995	995	....	1595	1695
McFarlan.....1921	Own..	6-4½x6	140	33x5	6300	†6300	6300	7500	7500
Mercer.....Series 5	Own..	4-3⅝x6¾	132	32x4½	4500	†4500	*4500	5700	6200
Merit.....	Cont..	6-3¼x4½	119	32x4	2245	†2245	....	....	....
Meteor.....R&RR	Dues..	4-4¼x6	129	32x4½	5500	5500	....	....	....
Metz.....M6	Rut...	6-3½x5	120	32x4	1995	1995	....	2795	2895
Mitchell.....F-40	Own..	6-3¼x5	120	33x4	‡1750	1750	†1950	2800	2900
Mitchell.....F-42	Own..	6-3½x5	127	33x4	....	....	1995	....	....
Moller.....A	Own..	4-2¾x4	100	27x3½	2000	....	....	....	....
Monitor.....B50-52	Cont..	6-3½x5	121	33x4	....	1850	....	....	....
Monroe.....S-9 & 10	Own..	4-3¼x4½	115	32x3½	1440	1440	....	....	....
Monroe.....S-11 & 12	Own..	4-3¼x4½	115	33x4	....	....	....	2400	2500
Moon.....6-48	Cont..	6-3¼x4½	122	32x4	2285	2185	2685	3185	3185
Murray-Mac Six.....	Own..	6-3½x5¼	128	34x4½	4250	4250	4250	....	....
Nash.....681-7	Own..	6-3¼x5	121	33x4	1695	1695	†1850	2650	2895
Nash.....682	Own..	6-3¼x5	127	34x4½	....	....	1875	....	....
Nash Four.....41-4	Own..	4-3¼x5	112	32x3½	1395	1395	....	1985	2185
National Sextet.....BB	Own..	6-3½x5¼	130	32x4½	3750	†3750	3750	4900	4950
Nelson.....D	Own..	4-3⅛x4¾	104	32x4	....	1900	....	....	....
Noma.....1C	Cont..	6-3¼x4½	128	32x4½	3000	3200	....	....	4450
Northway.....	Own..	6-3½x5¼	128	33x5	4200	*4200	6000	5600	5400
Norwalk.....430-KS	Lyc...	4-3½x5	116	32x3½	..	1285	....	....	....
Oakland.....34-C	Own..	6-2⅞x4¾	115	32x4	1395	1395	....	2065	2065
Ogren.....6-60	Own..	6-3½x5¼	134	33x5	†3850	3750	3900	5000	5400
Oldsmobile.....43-A	Own..	4-3⅞x5¼	115	32x4	†1445	1445	....	2145	2145
Oldsmobile.....37A	Own..	6-2⅞x4¾	112	32x4	†1450	1450	....	2145	2145
Oldsmobile.....46	Own..	8-2⅞x4¾	122	33x4½	....	†2100	2100	....	3300
Oldsmobile.....47	Own..	8-2⅞x4½	115	32x4	....	†1695	....	2395	2395
Overland.....4	Own..	4-3⅜x4	100	30x3½	895	895	....	1425	1475
Packard.....Single-Six	Own..	6-3⅜x4½	116	33x4½	2975	2975	§	4150	4250
Packard.....Twin Six	Own..	12-3 x5	136	35x5	6000	*6000	6000	8200	8450
Paige.....6-42	Own..	6-3½x5	119	32x4	1795	1795	....	2600	2720
Paige.....6-66	Cont..	6-3⅜x5	131	33x4½	†2995	....	2895	3775	3850
Pan.....A	Own..	4-3¼x5	108	33x4	....	1500	....	....	....
Pan American.E&F-6-55	H-S...	6-3¾x5	121	33x4	2250	2250	....	....	....
Parenti.....1921	Own..	8-2¾x4¼	125	32x4	....	2000	....	....	3000
Paterson.....650	Cont..	6-3¼x4½	120	33x4	....	1895	1925	2895	2895
Peerless.....56-S-7	Own..	8-3¼x5	125	34x4½	....	†2990	2990	3680	3950
Peters.....	Own..	2-3½x3⅝	90	28x3	385	....	....	....	....
Piedmont.....4-30	Lyc...	4-3½x5	116	32x3½	....	1395	....	....	....
Piedmont.....6-40	Cont..	6-3¼x4½	122	32x4	....	1795	....	....	....
Pierce-Arrow.....	Own..	6-4 x5½	138	35x5	8000	†7500	7500	8500	9000
Pilot.....6-50	H-S..	6-3¼x5	126	32x4½	2285	2285	2335	3600	3600
Porter.....40	Own..	4-4⅜x6¾	142	35x5	6750	Chassis Price			
Premier.....6-D	Own..	6-3⅜x5½	126¾	33x5	4600	†4600	4600	5600	6100
Premocar.....6-40 A	Falls.	6-3½x4¼	117	32x3½	....	1295	....	....	....
Premocar.....4-80	Dues..	4-4 x6	117	32x4½	....	3865	....	....	....
Raleigh.....A-6-60	H-S...	6-3¼x5	122	32x4½	‡2750	2750	....	3600	3700
Ranger.....A-20	Own..	4-3⅝x5	116	32x4	....	....	....	....	....
R & V Knight.....R	Own..	4-3⅜x5	116	32x4	....	2150	....	2850	2950
R & V Knight.....	Own..	6-3½x4½	127	32x4½	3350	†3350	3350	4000	4200
Reo.....T-6	Own..	6-3⅛x5	120	33x4	1850	1850	....	2700	2750
Revere.....C	Dues..	4-3⅝x6	131	32x4½	4850	4650	†4650	....	6500
Roamer.....6-54-E	Cont..	6-3½x5¼	138	32x4½	....	....	....	....	....
Romer.....	Cont..	6-3¼x4½	120	32x4	....	....	....	....	....
Rock Falls.....14000	Cont..	6-3¾x5	132	35x5	....	....	....	....	....
Rolls-Royce.....	Own..	6-4½x4¾	143½	33x5	U. S.	Chassis Price		11750	....
Saxon.....125	Own..	4-3⅜x5	112	32x4	....	1675	....	2475	2475
Sayers Six.....DP	Cont..	6-3¼x4½	118	33x4	2495	2195	....	....	3295
Scripps-Booth...B-39-42	Nort..	6-2⅛x4¾	115	32x4	‡1545	1545	....	2215	2295
Seneca.....L & O	LeR..	4-3½x4½	108	30x3½	1185	1185	....	....	....
Severin.....Six	Cont..	6-3½x5¼	122	33x4	1485	1485	....	2100	2250
Severin.....Six	Cont..	6-3½x5¼	122	33x5	2550	2550	2550	3250	3350
Sheridan.....4	Nort..	4-3⅛x5¼	116	33x4	1685	1685	....	2565	2765
Sheridan.....8	Nort..	8-3½x4½	132	33x5	....	....	....	....	....
Skelton.....35	Lyc...	4-3½x5	112	32x3½	1295	1295	....	....	....
Southern Six.....660-2	H-S...	6-3¼x5	127	32x4½	2875	2875	2995	....	....
Standard.....J	Own..	8-3¼x5	127	34x3½	3400	†3400	3400	4500	4500
Stanley Steamer.....	Own..	2-4 x5	130	34x4½	....	3950	3950	5650	5775
Stanwood Six.....	Cont..	6-3¼x4½	118	33x4	2050	2050	....	2950	2950
Stearns.....SKL4	Own..	4-3⅜x5⅝	125	34x4½	2550	2450	2675	3400	3700
Stephens.....90	Own..	6-3¼x4½	122	33x4½	2400	†2400	2400	3400	3400
Stevens Duryea.....E	Own..	6-4⅛x5½	138	35x5	8500	†8000	8000	9500	9500
Studebaker.....EJ-40	Own..	6-3½x4½	112	32x4	°1850	1485	....	....	2150
Studebaker.....EH-50	Own..	6-3½x5	119	32x4	1750	1750	†1750	2650	2750
Studebaker.....EG-60	Own..	6-3⅞x5	126	33x4½	....	....	2150	....	....
Stutz.....	Own..	6-4⅜x6	130	32x4½	3900	†4000	*4000	5500	....
Templar.....A-445	Own..	4-3⅝x5½	118	32x4	2885	2885	†2885	3785	3785
Texan.....A-38	Lyc...	4-3½x5	115	33x4	1195	1195	....	....	....
Texan.....C-12	H-S...	4-3½x5	115	33x4	1650	1650	....	....	....
Tulsa.....E-1-2-3	H-S...	4-3½x5	117½	33x4	1385	1385	....	....	....
Velie.....48	Cont..	6-3¼x4½	115	32x4	1885	1885	†2200	2885	2885
Velie.....34	Falls.	6-3⅜x4¼	112	32x3½	1485	1485	....	....	2485
Vogue.....6-55	H-S...	6-3¼x5	124	32x4	....	2285	2360	3050	3050
Vogue.....6-66	Cont..	6-3½x5¼	124	33x4½	....	2485	2560	3250	3250
Washington.....	Fal's..	6-3⅛x4¼	114	32x4	....	1685	....	....	....
Wasp.....2611	Wisc.	4-4⅜x5½	132	33x5	....	†6500	....	....	....
Westcott.....C-48	Cont..	6-3½x5¼	125	32x4½	....	2990	2990	....	4590
Westcott.....C-38	Cont..	6-3¼x4½	118	33x4	2290	2290	....	3390	3390
Wharton.....A	Curt..	8-4 x5	136	34x4½	....	†4885	4885	....	....
Wills-Sainte Claire.....	Own..	8-3¼x4	121	32x4½	3275	3200	....	....	....
Willys-Knight.....20	Own..	4-3⅝x4½	118	33x4	2195	2195	....	2845	2945
Winther.....61	H-S...	6-3¼x5	120	32x4½	....	....	....	....	....
Winton.....25	Own..	6-3¾x5¼	132	35x5	4600	†4975	4600	5950	†5950

*—6-passenger. †—4-passenger. ‡—3-passenger. °—Special Body.

Engine Make: Cont—Continental. D.Ly—Dort Lycoming. Dues.—Duesenberg. GBS—Golden, Belknap & Swartz. H-S—Herschell-Spillman. Lyc—Lycoming. Nort—Northway. Rut—Rutenber. Tee—Teetor. Wal—Walther. Wisc—Wisconsin. Weid—Weidely. LeR—Leroi. Curt—Curtiss. §—Model 47—34x4½ Tires.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason, R	1	$2260	3¾x5¼	36x3½	36x5	W
Acason, RB	1½	2485	3¾x5¼	36x3½	36x6	W
Acason, H	2½	3295	4⅜x5⅝	36x4*	36x4d*	W
Acason, L	3½	4295	4⅜x5⅝	36x5*	36x5d*	W
Acason, M	5	5250	5 x6¼	36x6	40x12	W
Ace, C	1½	2750	3¾x5½	34x3½*	34x5*	W
Ace, A	2½	3450	4¼x5½	36x4*	36x7	W
Ace	3	3650	4¼x5½	36x6	36x8	W
Acme, B	1	2175	3¾x5	34x3½	34x5	W
Acme, F	1½	2475	3¾x5	34x3½	34x5	W
Acme, A	2	3050	4½x5¼	36x4	36x7	W
Acme, C	3½	4050	4½x5½	36x5	40x10	W
Acme, E	5	5150	4¾x6	36x6	40x12	W
Acme, G	¾	1790	3¾x5	35x5†	35x5†	W
Akr'nMulti-Trk20	1	2485§	4 x5¼	34x5	34x5	B
All-Power, C	3½	5800	4½x6	36x7	36x10	W
All-American, B-1	1	1795	3½x5	32x4	32x4	I
All-American C-1	1½	2195	3½x5	34x4	34x5	I
American, 25	2½	3575	4 x6	36x4*	36x4d*	W
American, 40	4	4575	4½x6	36x5*	36x5d*	W
Apex, G	1	1675	3¾x5	33x5†	33x5†	I
Apex, D	1½	1915	3¾x5½	34x3½	34x4	I
Apex, E	2½	2695	4¼x5½	36x4	36x7	I
Apex, F	3½	3975	4½x6	36x5	36x10	I
Armleder, HW	2½	....	4¼x5½	36x4*	36x7*	W
Armleder, KW	3½	....	4½x6	36x5	36x5d	W
Armleder, 20	1	....	3¾x5¼	34x3½*	34x5*	W
Atco, B	1½	....	3¾x5¼	34x5†	36x6*	I
Atco, B1	1½	....	3¾x5¼	34x5†	36x6†	I
Atco, A	2½	....	4¼x5½	36x4†	36x8*	W
Atlas, M.D	1	....	3½x5	32x4½†	32x4½†	W
Atterbury, 20R	1½	2775	3¾x5	34x3½	34x5	W
Atterbury, 7CX	2½	3375	4⅛x5¼	36x4	36x4d	W
Atterbury, 7D	3½	4175	4½x5½	36x5	40x5d	W
Atterbury, 8E	5	5575	4¾x6	36x5	40x6d	W
Autocar, 21UF	½-2	2300	4¾x4½*	34x4*	34x5*	D
Autocar, 21UG	1½-2	2400	4¾x4½*	34x4*	34x5*	D
Autocar, 26Y	....	4350	4¼x5½	34x5	36x10	D
Autocar, 26-B	....	4500	4¼x5½	34x5	36x10	D
Available, H1½	1½	2750	4 x5½	36x3½*	36x5*	W
Available, H2½	2½	3475	4 x5½	36x4*	36x8*	W
Available, H3½	3½	4475	4½x5½	36x5	40x5d	W
Available, H5	5	5375	4¾x6	36x6	40x12	W
Available, H7	7	6000	5 x6	36x6	40x14	B
Avery	1	....	3 x4	34x5†	34x5†	I
Beck, A. Jr.	1	1800	3¾x5	34x3½	34x4	I
Beck, C	2	2550	4½x5½	36x4	36x6	I
Bell, O	2½	2750	4½x5½	34x4	34x7	I
Bell, E	3½	2250	3¼x5¼	34x3½	34x5†	I
Belmont, E	2	2195	3¾x5	34x3½*	34x6*	D
Belmont, D	3½	3195	4 x6	36x5*	36x5d*	D
Bessemer, G	1	1700	3½x5	35x5†	35x5†	I
Bessemer, H-2	1½	2445	3¾x5	36x3½	36x5	I
Bessemer, J-2	2½	3285	4⅛x5¼	36x4	36x4	I
Bessemer, K-2	4	4485	4½x5½	36x6	36x10	I
Bethlehem, K	1	1695	3½x5	34x4½†	35x5	I
Bethlehem, G	2	2725	4 x5¼	34x3½*	34x6*	I
Bethlehem, H	3	3250	4 x5½*	36x4*	36x8	I
Bethlehem, J	4	4195	4½x5½	36x5*	36x5d*	I
Bollstrom, 30	1½	2100	3¾x5¼	34x3½	34x6	I
Bollstrom, 50	2½	2800	4¼x5½	36x4	36x8	I
Bollstrom, 70	3½	3800	4½x6	36x5	36x10	I
Bollstrom, A-20	4	6000	5¾x7	40x8†	40x8†	I
Bollstrom, B21	4	5050	4½x5½	36x7	36x7	I
Bridgeport, A	1½	2350	3¾x5¼	34x3	34x6	W
Bridgeport, B	2½	2850	4¼x5½	36x4*	36x7*	W
Bridgeport, C	4	3650	4½x6	36x5	36x5d	W
Bridgeport, D	6	4500	4½x6	36x6	36x6d	W
Brinton, F	2½	3400	4¼x5¼	36x4	36x7	W
Brockway, E	¾	1675	3¾x5	35x5†	35x5†	B
Brockway, S-4	1½	2250	3¾x5	36x3½*	36x5*	W
Brockway, K-5	2½	3200	4½x5½	36x4	36x7	W
Brockway, R-4	3½	4100	4½x5½	36x5	36x5d	W
Brockway, T	5	5250	4¾x6	36x6	40x6d	W
Case, ††	2	3000	4¼x5¾	36x6	38x7	I
Capitol, G1½	1½	2975	3¾x5	35x5	38x7	W
Capitol, H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol, K2½	2½	4250	4¼x6	36x6	42x9	W
Capitol, M3½	3½	4425	4¼x6	36x5	36x10	W
Champion Light Commercial	½	1100	3½x5	32x3½	32x3½	I
Chevrolet, G	¾	920	3½x4	31x4†	34x4½†	B
Chevrolet, T	1	1325	3½x5¼	33x4†	35x5†	I
Chicago, C1½	1½	....	3¾x5⅛	36x3½*	36x5*	W
Chicago, C2½	2½	....	4 x5⅛	36x4*	36x7*	W
Chicago, C3½	3½	....	4½x5½	36x5	36x10	W
Chicago, D5	5	....	4½x5½	36x6	40x12	W
Climber, A 20	1½	2450	3½x5	36x6*	38x7*	I
Clydesdale, 32C	1	2375	4⅜x5	34x3½*	34x5*	W
Clydesdale, 42C	1½	2750	4⅜x5	36x3½	36x5	W
Clydesdale, 65C	2½	3540	4¼x5½	36x4	36x7	W
Clydesdale, 65EC	2½	3775	4½x5½	36x4	36x7	W
Clydesdale, 90C	3½	4400	4½x5½	36x5	40x10	W
Clydesdale, 120C	5	5500	4¾x6	36x6	40x12	W
Collier, 18	1	....	3¾x5	34x4	34x5	W
Collier, 19	1½	....	3¾x5	36x4	36x6	W
Collier, 21	2	....	4⅛x5¼	36x4	36x7	W
Collier, 22	2½	....	4⅛x5¼	36x4	36x4	I
Columbia, H	1½	2350	3¾x5	35x5†	34x5	I
Columbia, G	2½	2850	4 x5¼	36x4	36x7	I
Comet	1½	1950	3¾x5	34x4	34x4	W
Commerce, T	¾-1½	1450	3¾x5	34x4½†	34x4½†	B
Commerce, 12	1½	1800	3¾x5	35x5†	35x5†	I
Commerce, 16	2	2150	3¾x5	35x5†	35x6†	I
Concord, A	1½	2700	4 x5½	36x3½	36x6	W
Concord B	2½	3600	4¼x5½	36x4	36x8	W
Concord AX	1½	2950	4 x5½	36x3½	36x6	W
Concord, BX	2½	3600	4½x5½	36x4	36x8	W
Cook, 41	2	3000	4 x5½	36x6†	38x7†	I
Corbitt, E	1	2400	3¾x5	34x3½	34x4	W
Corbitt, D	1½	2800	3¾x5	36x3½	36x5	W
Corbitt, C	2	3500	4⅛x5¼	36x3½	36x7	W
Corbitt, B	2½	3650	4⅛x5¼	36x4	36x7	W
Corbitt, A	3½	4500	4½x5½	36x5	36x10	W
Corbitt, AA	5	$5500	4¾x6	36x6	40x6d	W
Cyclone	1½	2800	3½x5	34x5†	36x6†	I
Dart, S	1½	....	3¾x5¼	34x3½	34x6	W
Dart, M	2½	....	4¼x5½	36x4	36x7	W
Dart, W	3½	....	4½x6	36x5	36x10	W
Day-Elder, A	1	2225	3¾x5	34x3½	34x4	W
Day-Elder, B	1½	2425	3¾x5	34x3½	34x5	W
Day-Elder, D	2	2900	4¼x5¼	36x4*	36x7	W
Day-Elder, C	2½	3125	4¼x5	36x4	36x7*	W
Day-Elder, F	3½	3950	4½x5½	36x5*	36x5d*	W
Day-Elder, E	5	4875	4½x6	36x5	36x6d	W
Dearborn, F	1½	2180	3¾x5⅛	34x4*	34x5*	W
Dearborn, 48	2	2590	3¾x5⅛	35x5†	34x7†	W
Defiance G	1	1975	3¾x5	35x5†	35x5†	I
Defiance, D	1½	2550	3¾x5	35x5†	36x6†	I
Defiance, E	2	2750	3¾x5	35x5†	38x7†	I
DeKalb, E2	2½	2250	4½x5¼	34x3½*	36x5*	W
DeKalb, E2½	2	2600	4½x5¼	36x4*	36x6*	W
DeMartini 1½	1½	2600	3¾x5	34x3½	34x6	W
DeMartini 2	2	3300	4 x5½	36x3½	36x7	W
DeMartin i3	3	4250	4¼x5½	36x4	36x10	W
DeMartini 4	4	4800	4½x6	36x5	36x12	W
Denby, 33	1½	2300	3¾x5	35x5†	38x7†	I
Denby, 134	2	2800	3¾x5	36x3½	36x6	I
Denby, 25	3	3600	4½x5½	36x4	36x7	I
Denby, 27	4	4600	4½x5½	36x5	36x5d	I
Denby, 210	5	5350	4½x5½	36x6	40x6d	I
Dependable, A	¾-1	1650	3½x5	34x5	36x6	W
Dependable, C	1½	2350	3¾x5¼	34x3½	34x5	W
Dependable, D	2	2650	4 x5½	34x5	36x6	W
Dependable, E	2½	2950	4¼x5½	36x4	36x7	W
Dependable, G	3½	3350	4½x6	36x6	38x7	W
Diamond T, O	1	2500	3¾x5¼	34x5†	36x6†	W
Diamond T, FS	1½	2960	3¾x5¼	36x3½	36x5	W
Diamond-T, T	1½	2650	3¾x5¼	36x3½	36x5	W
Diamond-T, U	2	3285	4 x5¼	36x4	36x7	W
Diamond-T, K	3½	4675	4¼x5½	36x5	36x5d	W
Diamond-T, EL	5	5400	4½x5½	36x6	40x6d	W
Diamond-T, S	5	5650	4¾x6	36x6	40x6d	W
Diehl, A	1	....	3½x5	34x4½	35x5	I
Diehl, B	1½	....	3½x5	36x6	36x6	I
Dispatch, F	1	1350	3¾x5	34x4†	34x4†	I
Doane	2½	4100	4¼x5¾	36x5	36x7	C
Doane	3½	5100	4½x5¾	36x5	36x5d	C
Doane	6	6000	4¾x6¾	36x6	40x6d	C
Dodge Brothers	½	1085	3⅞x4½	33x4†	33x4†	B
Dorris, K-4	2	3400	4¼x5½	36x4	36x7	W
Dorris, K-7	3½	4400	4¼x5½	36x5	36x10	W
Double Drive C	1½	2800	3¾x5½	5	4	W
Double Drive B	3	4000	4¼x5½	6	6	W
Douglas G	1½	2050	3¾x5⅛	36x5*	37x8*	W
Douglas I	3	3250	4¼x5½	36x6*	37x8*	W
Duplex, A	1½	2775	4 x5¼	35x5†	38x7†	W
Duplex, E	3½	4250	4½x5½	36x8	36x8	I
Duty, 21	2	1490	3½x5	34x3½	34x5	I
Eagle, 100-2	2	2275	3¾x5¼	34x3½*	34x6*	I
Erie, A	2½	....	4¼x5½	36x4	36x4d	W
Facto, 1921	2½	2895	4¼x5½	36x4*	36x8*	W
Fageol, (Cal.)	1½	3000	3¾x5¼	34x3½*	34x6*	W
Fageol, (Cal.)	2½	3900	4¼x5¾	34x4	36x7	W
Fageol (Ohio) Md	2½	3900	4¾x5½	36x4*	36x4*	W
Fageol (Ohio) Hd	3½	5000	4½x6¼	36x5*	40x5d*	W
Fageol, (Cal.)	3½	5000	4½x6¼	36x5	36x5d	W
Fageol, (Cal.)	5	5700	4½x6¼	36x6	40x6d	W
Famous, B10	1	1800	3½x5	36x2½	36x4	I
Famous, B12	1½	2100	3¾x5	36x3½	36x5	I
Fargo, R	2	2500	3¾x5	36x4	36x6	I
Federal, SD	1	2500	3¾x5	35x5†	36x6†	W
Federal, TE	1½	2725	4½x5¼	36x3½	36x5	W
Federal, UE	2	3025	4½x5¼	36x4	36x7	W
Federal, WE	3½	3950	4½x5½	36x5	36x5d	W
Federal, X2	5	5350	4¾x5	36x6	40x6d	W
Ford, TT	1	545	3¾x4	30x3½*	32x4½*	W
Forschler, A	1	....	3½x5	36x3	36x4	W
Forschler, AX	1½	....	3½x5	36x3½	36x5	W
Forschler, B	2	....	4½x5¼	36x4	36x7	W
Forschler, BX	3	3450	4½x5¼	36x4	36x8	W
F.W.D., B	3	4200	4¾x5½	36x6	36x6	B
Fulton, A	¾	1750	3½x5	35x5†	35x5†	B
Fulton, C	2	2350	3½x5	34x4	34x6	I
Garford, 25	1¼	2090	3¾x5⅛	36x3½	36x4	W
Garford, 70-H	2	3190	4¼x5½	36x4	36x7	W
Garford, 68D	5	5200	5 x6½	36x6	40x6d	W
Garford, 77D	3½	4390	4½x6	36x5	36x6d	W
Garford, 150-A	7½	5500	5x6½	36x6	40x7d	C
Gary, F	1	2100	3¾x5	36x3½	36x4	W
Gary, I	1½	2550	4¼x5½	35x5†	38x7†	W
Gary, J	2½	3150	4¼x5½	36x6*	40x8*	W
Gary, K	3½	4050	4½x6	36x5	40x5d	W
Gary, M	5	5150	5 x6½	36x6	40x6d	W
G.M.C., 16	¾	....	3¾x5	35x5†	35x5†	B
G.M.C., 31	1½	....	3¾x5	36x3½	36x5	W
G.M.C., 41	2	....	4¼x5½	36x4	36x7	W
G.M.C., 71	3½	....	4½x5½	36x5	40x5d	W
G.M.C., 101	5	....	4½x5½	36x6	40x6d	W
Gersix M	1½	3100	4 x5½	36x3½	36x7	W
Gersix K	2½	3500	4¼x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Giant, 15-A	1½	2425	3¾x5	34x3½	34x5	W
Giant, 16	2	3250	4½x5¼	36x4	36x7	W
Giant, 17	3½	4150	4½x5½	36x5	36x5d	W
Globe D-20	¾	....	3¾x5	33x4½†	33x4½†	B
Golden West, G	3½	4500	4½x5½	36x6	36x6	W
Golden West, H	3½-4	5000	4½x6	36x6	36x6	W
Golden West, HA	7	6000	4½x6	36x6	36x10	W
Golden West, GH	3	4500	4½x6	36x6	36x6	W
Golden West, T	4	5300	4¾x6	36x6	36x6	W
Golden West, K	7	6000	5½x6	36x6	36x6	W
Gove, A1	2½	....	4⅛x5¼	36x4*	36x7*	I
Graham Bros. A	1½	2495	3¾x5	35x5†	36x6†	I
Gramm-Bern., 10	1	1495§	3½x5	33x5†	33x5†	B
Gramm-Bern., 15	1½	2050§	3¾x5	36x3½*	36x5*	I
Gramm-Bern., 65	1½	2725§	3¾x5	36x3½*	36x5	W
Gramm-Bern., 20	2	3175§	4½x5¼	36x4*	36x7*	W
Gramm-Bern., 25	2½	$3575§	4¼x5½	36x4*	36x4d*	W
Gramm-Bern., 35	3½	4375§	4½x5½	36x5	40x5d*	W
Gramm-Bern., 50	5	5275§	4¾x6	36x6	40x6d*	W
G.W.W.	1½	2100	3¾x5½	35x5	35x5	I
Hahn, J4	1	....	3¾x5	34x5*	34x5*	W
Hahn, CD	1½	....	4¼x5¼	36x3½*	36x6*	W
Hahn, EE	2½	....	4½x5½	36x4*	36x8*	W
Hahn, F	3½	....	4½x5½	36x5*	36x10 *	W
Hahn, EF	5	....	4¾x6	36x6	40x12	W
Hal Fur, E	1	2350	4 x5	35x5†	35x5†	W
Hal Fur, B	2½	3250	4¼x5½	35x5*	38x7*	W
Hal Fur, F	3½	4250	4½x5½	36x6†	40x10†	W
Hall	1½	3100	3¾x5	34x5†	38x7†	W
Hall	2½	3275	4⅛x5¼	36x4	36x6	W
Hall	3½	4100	4½x5½	36x5	36x5d	W
Hall	5	5100	4½x5½	36x5	40x6d	W
Hall	7	5100	4½x5½	36x5	40x6d	C
Harvey, WEA	1½	2550	4⅛x5½	34x3½	34x5	W
Harvey, WFA	2½	3300	4¼x5½	36x4	36x7	W
Harvey, WHA	3½	4300	4½x6	36x5	36x5d	W
Harvey, WKA	5	5200	4½x6	36x6	40x6d	W
Hawkeye, K	1½	2365	3¾x5¼	34x3½*	34x5*	I
Hawkeye, M	2	2915	4¼x5½	36x4*	36x6*	I
Hawkeye, N	3½	4345	4½x6	36x5*	36x10*	I
Hendrickson, K	5	4800	....	....	....	....
Hendrickson, N	2½	3150	4¼x5½	36x4*	36x7*	W
Hendrickson, M	3½	3975	4¼x5¾	36x5*	36x5d*	W
Highway, A410	4	....	4 x6	36x5	36x6d	W
Highway, B510	5	....	4 x6	36x5	40x6d	W
Higrade, A17	¾	1850	3½x5	32x4½	32x4½	W
Higrade, A18	1	2100	3½x5	35x5†	35x5†	W
Higrade, B20	1½	2500	4⅛x5¼	35x4†	36x6†	W
Huffman, B	1½	1995	3¾x5	34x3½	34x6	W
Huffman, C	1½	1795	3¾x5½	34x3½	34x6	I
Hurlburt	1½	....	4 x5½	34x4	34x5	W
Hurlburt	2½	....	4¼x5½	36x4	36x4d	W
Hurlburt	3½	....	4½x6	36x5	36x5d	W
Hurlburt	5	....	4½x6	36x5	40x6d	W
Huron Erie	1½	2425	3¾x5¼	36x3½	36x5	I
Huron Mich.	2½	2950	4¼x5½	36x4	36x7	W
Indep'd't(Iowa),G	1½	2040	3¾x5¼	34x3½	34x5	I
Indep'd't(Ia.),H.I.	2½	2940	4½x5¼	34x4	34x6	I
Indep'd't(Iowa), B	1	1665	3½x5	34x3½	34x4	W
Indep't'd(Ohio), F	1½	2585	3¾x5	36x3½	36x5	W
Indep't'd(Ohio) H	2½	3285	4½x5¼	36x4	36x4d	W
Indep'd't(Ohio) K	3½	4285	4½x5½	36x5	36x5d	W
Indiana, 12	1¼	....	3¾x5¼	34x3½*	34x5*	W
Indiana, 20	2	....	4½x5½	36x4*	36x7*	W
Indiana, 25	2½	....	4½x5½	36x4*	36x8*	W
Indiana, 35	3½	....	4½x5½	36x5*	36x5d*	W
Indiana, 51	5	....	5 x6¼	36x5*	40x6d*	W
Inland, D	2	2950	4 x5	34x5	34x6	I
International, 21	1	1850	3½x5¼	36x3½	36x3½	I
International, S	¾	1500	3½x5	34x5†	34x5†	I
International, 31	1½	2050	3½x5¼	36x3½	36x4	I
International, 41	2	2400	3½x5¼	36x3½	36x5	I
International, 61	3	2800	4¼x5	36x4*	36x6*	I
International, 101	5	4500	4½x5	36x5	40x10	I
Jackson, 4WD	3½	4550	4½x5½	36x7	36x7	B
Jumbo, 15	1½	2425	3¾x5¼	36x3½	36x5	I
Jumbo, 20	2	2675	3¾x5¼	35x5†	38x7†	I
Jumbo, 25	2½	3090	3¾x5¼	36x4	36x7	I
Jumbo, 30	3	3590	4¼x5½	36x6†	42x9†	I
Jumbo, 35	3½	4080	4½x6	36x5	36x10†	I
Jumbo, 40	4	4730	4 x6	38x7†	44x10	I
J & J, D	2	3250	4 x5	34x4*	34x6	I
Kalamazoo, G-1	1½	2800	3¾x5	34x4	34x5	W
Kalamazoo, G-2	1½-2	3100	3¾x5	36x4*	36x5*	W
Kalamazoo, H	2½	3700	4 x6	36x4	36x8	W
Kalamazoo, K	3½	4300	4¼x6	36x5	36x10	W
Karavan, A	2½	....	4¼x6	36x4	36x8	W
Kearns, H	¾	1600	3¼x4½	32x4½†	32x4½†	I
Kearns, N	1½	2200	3½x5	34x3½	34x6	I
Kelly-S, K-31	1½	2900	3¾x5¼	36x3½	36x6	C
Kelly-S, K-35	2½	3250	3¾x5¼	36x4	36x4d	C
Kelly-S., K-34	1½	2900	3¾x5¼	36x3½	36x6	W
Kelly-S., K-36	2½	3250	3¾x5¼	36x4	36x4d	W
Kelly-S., K-40	3½	4200	4½x6½	36x5	40x5d	C
Kelly-S., K-50	5	4900	4½x6½	36x6	40x6d	C
Kelly-S., K-60	6	5100	4½x6½	36x6	40x7d	C
Kelly-S., K-41	3½	4200	4½x6½	36x5	40x5d	I
Kelly-S., K-42	3½	4200	4½x6½	36x5	40x5d	W
Kelly-Springfield K-45	4	4550	4½x6½	36x5	40x6d	C
Keystone, 40	2	2450	3¾x5⅛	34x5†	38x7†	I
Kimball, AB	2	3675	4 x6	36x4	36x7	W
Kimball, AC	2½	3975	4¼x6	36x4	36x8	W
Kimball, AK	3	4500	4½x6	36x4	36x10	W
Kimball, AE	4	5000	4¾x6	36x5	40x10	W
Kimball, AF	5	5975	5 x6	36x6	40x12	W
Kissel, Express	1	1985††	3¾x5½	34x5†	34x5†	W
Kissel, Utility	1½	2775	3¾x5½	36x3½	36x5	W
Kissel, Freighter	2½	3475	4¼x5½	36x4	36x7	W
Kissel, H. D.	4	4475	4¼x5½	36x5	36x5d	W
Kleiber, AA	1	2800	4⅛x5¼	34x3½*	34x5*	W
Kleiber, A	1½	3100	4½x5¼	36x3½*	36x6*	W
Kleiber, BB	2	4000	4½x5¼	36x4*	36x7*	W
Kleiber, B	2½	4200	4½x5½	36x5*	36x8	W
Kleiber, C	3½	4900	4½x5½	36x5	36x5d	W
Kleiber, D	5	5600	5 x6½	36x6	40x12	W
Koehler, D	1½	2285	3½x5	34x3½	34x5	W
Koehler, M	2½	3365	4 x5½	36x4	36x7	W
Koehler, MCS	2½	3450	4 x5½	36x4	36x7	W
Koehler, F	3½	....	4½x5½	36x5	36x10	W
Koehler,MT, Trac	5	3450	4 x5½	36x4	36x7	W
K-Z, 1	1	2250	3½x5	34x3½	34x5	W
K-Z, 1½	1½	2750	3¾x5	36x4	36x8	W
K-Z, 2½	2½	3250	4⅛x5¼	36x4	36x8	W
K-Z, 3½	3½	4250	4½x5½	36x5	40x10	W
K-Z, 5	5	5200	4½x5½	36x6	40x6d	W
Lange, B	2½	3350	4⅛x5¼	36x4*	36x6*	C
Larrabee, U	1½	2400	3¾x5	34x3½	34x5	W

See next page for notes on truck specifications.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Larrabee, K	2½	$3400	4½x5½	36x4	36x7	W
Larrabee, L	3½	4200	4½x5½	36x5	36x5d	W
Larrabee, W	5	5100	4¾x6	36x6	40x6d	W
L.M.C., 2-20	2½	2540	4½x5½	36x4	36x4d	I
Lion, L	1	2350	3¾x5½	35x5†	35x5†	W
Lone Star, 9	1½	1545	3½x5	32x3½†	32x4†	I
Luedinghaus, K	2-2½	3150	4¼x5¾	36x4*	36x7*	W
Luedinghaus, C	1	2100	3½x5	35x5†	35x5†	W
Luedinghaus, W	1½	2700	3¾x5½	34x3½*	34x5*	W
Maccar, L	1½	2925	4½x5½	36x4	36x6	W
Maccar, H	2½	3650	4½x5½	36x4	36x4d	W
Maccar, M-2	3½	4500	4½x6	36x5	36x5d	W
Maccar, G	5	5500	4¾x6	36x5	40x6d	W
MacDonald, A	7½	5750	4½x6	40x7	40x14	I
Mack, AB D.R.	1½	3450	4 x5	36x4	36x3½d	D
Mack, AB Chain	1½	3000	4 x5	36x4	36x3½d	C
Mack, AB Chain	2	3300	4 x5	36x4	36x4d	C
Mack, AB D.R.	2	3750	4 x5	36x4	36x4d	D
Mack, AC Chain	3½	4950	5 x6	36x5	40x5d	C
Mack, AC Chain	5	5500	5 x6	36x6	40x6d	C
Mack, AC Chain	6½	5750	5 x6	36x6	40x12	C
Mack, AC Chain	7½	6000	5 x6	36x7	40x7d	C
Mack Trac., AB	5	3400	4 x5	36x4	36x4d	C
Mack Trac., AC	7	4950	5 x6	36x5	40x5d	C
Mack Trac., AC	10	5500	5 x6	36x6	40x6d	C
Mack Trac., AC	13	5750	5 x6	36x6	40x12	C
Mack Trac., AC	15	6000	5 x6	36x7	40x7d	C
Mapleleaf, AA**	2	4150	4 x5¼	34x4	36x6	W
Mapleleaf, BB**	3	4775	4¼x5½	36x4	36x4d	W
Mapleleaf, CC**	4	5770	4½x5½	36x5	36x5d	W
Mapleleaf, DD**	5	6825	4½x5½	36x6	40x6d	W
Master, JW	1½	2690	4½x5½	34x3½	34x5	W
Master, W	2½	3290	4¼x5½	34x4	36x7	W
Master, D	2½	3540	4¼x5½	34x4	36x7	D
Master, A	3½	4190	4½x6	36x5	40x5d	W
Master, E	3½	4640	4½x6	35x5	40x5d	D
Master, B	5	5290	4¾x6½	36x6	40x6d	W
Master, F	5	5440	4¾x6½	35x5	40x6d	D
Master Trac., T	6	3740	4¼x5½	34x4	36x4d	I
Maxwell, 1½	1½	1332	3⅝x4¼	32x3	32x4	W
Menominee, HT	1	2080	3¾x5	34x3½	36x5	W
Menominee, H	1½	2725	4 x5	36x3½	36x5	W
Menominee, D	2	3245	4 x6	36x4	36x4d	W
Menominee, G	3½	4270	4½x6	36x5	36x5d	W
Menominee, J3	5	5450	4¾x6	36x6	40x6d	W
Moline, 10	1½	2450	3½x5	34x5†	36x6†	I
Moreland, 20N	1	2850	3¾x5	35x5†	36x6†	I
Moreland, 21B	1½	3125	4¼x5½	36x3½	36x6	W
Moreland, 21C	2½	3900	4½x5½	36x4	36x8	W
Moreland, 21H	3½	4975	4¾x6	36x5	40x5d	W
Moreland, 21J	5	5350	4¾x6	36c6	40x6d	W
Mutual, 2B	2	3450	4 x6	36x4	36x8	W
Mutual, 2BP	2½	4150	4 x6	38x7†	42x9†	W
Napoleon, 7	¾-1	1350	3½x5	38x4	33x4†	I
Napoleon, XX-7	1	1535	3½x5	35x5*	35x5*	I
Napoleon, 11	1½	1860	3½x5	35x5*	36x6*	I
Nash, 2018	1	1895	3¾x5½	34x3	34x4	I
Nash, 3018	2	2550	3¾x5½	34x4	34x6	I
Nash, Quad.	2	3250	4¼x5½	36x5	36x5	I
*Nelson, F1½	1½	....	4¼x5½	36x3½	36x6	W
*Nelson, F2	2	....	4½x5¼	36x4	36x7	W
*Nelson, F3½	3½	....	4½x5½	36x5	36x5d	W
*Nelson, FC5	5	....	4¾x6	36x6	40x6d	W
Netco, D	2	3100	4½x5¼	36x4*	36x7*	W
Netco, H	2½	3500	4½x5½	36x4*	36x8*	W
New York, M	1½	....	4½x5¼	36x3½	36x5	W
New York, N	2-2½	....	4½x5¼	36x4	36x4d	W
Niles, E	2	3000	4½x5¼	36x4*	36x7*	W
Noble, B30	1½	2585	3¾x5¼	36x3½	36x5	W
Noble, C40	2	2825	4 x5½	36x4	36x7	W
Noble, D50	2½	3150	4½x5½	36x4	36x8	W
Noble, E70	3½	4030	4½x6	36x5	36x10	W
Northway, B-2	2	3400	4 x6	36x4	36x4d	W
Northway, B-3	3½	4400	4 x6	36x5	40x5d	W
Northwestern W	2	3300	4¼x5½	34x4	36x6	W
Northwestern WS	2½	3300	4½x5½	36x4	36x8	W
Norwalk, 25E	1	1695	3½x5	34x3½	34x4	W
Norwalk, 35E	1½	2025	3½x5	34x3½	34x3½d	W
Ogden, A1	1½	2550	3¾x5	36x3½	36x5	W
Ogden, E	2½	3250	4½x5¼	36x4	36x7	W
O. K., K1	1½	2675	4 x5½	36x3½†	36x7†	W
O. K., L1	2½	3450	4¼x5½	36x4	36x8	W
O. K., M1	3½	4250	4½x6	36x5	36x5d	W
Old Hickory, W	1	2175	3¾x5	36x3½*	36x4*	W
Old Reliable, A	1	2350	4 x5	34x4	36x6	W
Old Reliable, B	1½	3500	4¼x6	34x4	36x4d	W
Old Reliable, C	2½	4250	4¼x6	36x5	36x5d	W
Old Reliable, D	3½	5250	4¾x6	36x6	40x6d	W
OldReliable,KLM	5	6250	4¾x6½	36x6	40x7d	C
Oldamobile Econ.	1	1500	3½x5½	35x5†	35x5†	I
Olympic, A	2½	3500	4¼x5½	36x4	36x7	W
Oneida, A-9	1¼	2350	3⅜x5½	36x3½	36x5	W
Oneida, B-9	1¾	2915	4 x5¼	36x4	36x7	W
Oneida, C-9	2½	3390	4 x5¼	36x4	36x7	W
Oneida, D-9	3½	4345	4½x5½	36x5	36x10	W
Oneida, E-9	5	5460	4½x5½	36x6	40x12	W
Orleans, A	1½	2750	3¾x5½	36x3½	36x5	W
Orleans, B	2½	3250	4x5½	36x4*	36x7*	W
Orleans, C	3½	3750	4½x5½	36x4½	36x8	W
Orleans, D	5	4250	4½x5½	36x6	40x8	W
Oshkosh, A	2	3750	3½x5	36x6†	36x6†	4
Oshkosh, AA	2	3850	3½x5	36x6†	36x6†	4
Packard, EC	....	3700	4¼x5½	36x3½	36x6	W
Packard, ED	....	4450	4½x5½	36x5	36x5d	W
Packard, EF	....	5550	5 x5½	36x6†	40x6d†	W
Packard, EX	....	4200	4¼x5½	36x6†	38x7†	W
Paige, 52-19	1½	2880	4 x5¼	34x3½	34x6	W
Paige, 54-20	2½	3400	4½x5½	34x4	34x4d	W
Paige, 51-18	3½	4285	4½x5½	36x5	36x5d	W
Parker ,P20	2	3500	4 x6	34x4	36x4d	W
Parker, J20	3½	4400	4½x6	36x5	40x5d	W
Parker, M20	5	5500	4¾x6	36x6	40x6d	W
Patriot, Revere	¾	1785	3¾x5	35x5†	35x5†	W
Patriot, Lincoln	1½	2450	4 x5¼	34x3½*	34x5*	W
Patriot, Washgt'n	2½	$3450	4½x5½	36x4*	36x7*	W
Piedmont, 4-30	1½	1685	3½x5	34x4†	34x4†	W
Pierce-Arrow,	2	3750	4 x5½	36x4	36x4d	W
Pierce-Arrow	3½	4950	4½x6¾	36x5	36x5d	W
Pierce-Arrow	5	5700	4½x6¾	36x5	40x6d	W
Pioneer, 59	1	1650	3¾x4¼	32x4½†	32x4½†	W
Pittsburger, B	2½	3500	4½x5¼	36x5*	36x7*	W
Pony	¼	400	2¾x4	28x3†	28x3†	C
Power, F	1½	....	3¾x5¼	36x6	36x6	..
Power, C	3½	....	4¼x5½	36x5	40x10	W
Premocar, B-143	1½	2475	3½x5	36x6†	36x6†	W
Rainier, R-11	¾	2150	3½x5	35x5†	35x5†	W
Rainier, R-15	3½	4500	4½x5½	36x5	36x5d	W
Rainier, R-19	1	2350	3½x5	34x3½	31x4	W
Rainier, R-16	1½	2600	3¾xn	34x3½	34x5	W
Rainier, R-18	2	2950	4¼x5¼	34x4	34x6	W
Rainier, R20	2½	3600	4½x5¼	34x4	34x7	W
Rainier, R17	5	5250	4½x5½	36x6	36x6d	W
Ranger, TK-20-2	2	....	3¾x5	36x6†	36x6†	W
Reo, F	¾-1½	1385	4½x4½	34x4½†	34x4½†	B
Reliance, 10A	1½	2500	4 x5½	36x3½	36x5	I
Reliance, 20B	2½	3200	4¼x5½	36x4	36x4d	I
Republic, 10	1	1695	3¾x5	35x5†	35x5†	I
Republic,10Exp.††	1	2095	.....	35x5†	35x5†	I
Republic, 11X	1½	2295	3¾x5	34x3½	34x5	I
Republic, 19	2½	2795	4½x5¼	34x4	36x7	I
Republic, 20	3½	3845	4½x5½x	36x5	36x10	I
Riker, B	3	....	4¼x6	36x5	36x5d	W
Riker, BB	4	....	4¼x6	36x5	36x6d	W
Rowe, CW	1½	3000	3¾x5	36x6†	36x6†	W
Rowe, HW	4	4500	4¼x6	36x5	36c6d	W
Rowe, C. D. W.	2	3300	4 x5	34x4	36x3½d	W
Rowe, G. S. W.	3	4150	4 x6	34x5	36x5d	W
Rowe, G. P. W.	3	5250	3¼x5‡	38x7†	42x9†	W
Rowe, F. W.	5	5500	4½x6	36x6	40x6d	W
Rumely, A	1½	2720	3¾x5¼	36x3½	36x5	W
Samson, KO 15	¾	865	.....	32x4	32x4	B
Samson, E 25	1¼	1395	.....	35x5	35x5	B
Sandow, G	1	2295	3¾x5	34x3½	34x5	W
Sandow, CG	1½	2590	3¾x5	34x4	34x6	W
Sandow, J	2½	3275	4½x5¼	36x4	36x7	W
Sandow, M	3½	4295	4½x5½	36x5	36x5d	W
Sandow, L	5	4975	4½x5½	36x6	40x6d	W
Sanford, 25	2½	3350	4½x5¼	36x4	36x4d	W
Sanford, 35	3½	4200	4½x5½	36x5	36x5d	W
Sanford, 50	5	5100	4¾x6	36x5	40x6d	W
Schacht, 2-Ton	2	3550	4¼x5½	36x4	36x7	W
Schacht, 2½-Ton	2½	3850	4¼x5½	36x4	36x4d	W
Schacht, 3½-Ton	3½	4350	4¼x6	36x5	36x5d	W
Schacht, 5-Ton	5	5350	4½x6	36x5	40x6d	W
Schwartz, A	1	1585	3½x5	33x4½†	33x4½†	B
Schwartz, BW	1½	2600	3¾x5¼	34x3½*	34x7*	W
Schwartz, C.W.S.	2½	3200	4¼x5½	36x4	36x8	W
Schwartz, DW	5	4900	4½x6	36x6	40x12	W
Seiden, 1½A	1½	2360	3¾x5	34x3½	34x5	W
Seiden, 2½A	2½	3425	4¼x5¼	36x4	36x7	W
Seiden, 3½A	3½	4175	4½x5½	36x5	36x10	W
Selden, 5A	5	5600	4¾x6	36x6	40x12	W
Seneca, M20	½	....	3½x4½	30x3½†	30x3½†	B
Service, 220	1	2415	3½x5½	34x3½	34x5	W
Service, 15	¾-1	1840	4¾x5	34x4½	34x5	B
Service, 31	1½	2985	4 x5½	36x3½	36x6	W
Service, 36	1½	3415	4½x5½	35x5†	38x7†	W
Service, 51	2½	3475	4¼x5½	36x4	36x7	W
Service, 71	3½	4285	4¼x5½	36x5	36x5d	W
Service, 76	3½	4485	4½x6	36x5	36x5d	W
Service, 10	5	5275	4½x6	36x6	40x6d	W
Signal, NF	1	2475	4¾x5	34x5†	36x6†	W
Signal, H	1½	2925	4¼x5¼	34x4	36x6	W
Signal, J	2½	3275	4½x5¼	34x4	36x8	W
Signal, M	3½	4275	4½x5½	36x5	40x5d	W
Signal, R	5	5300	4¾x6	36x6	40x6d	W
Southern, 10	1	2090	3¾x5	34x4½	34x4	W
Southern, 15	1½	2590	3¾x5½	36x6†	34x4	W
Southern, 15	2	2990	4¾x5¼	36x6†	40x8*	W
Standard, 1-K	1-1¼	2250	3¾x5	34x3½*	34x4*	W
Standard, 1K	1-1¼	2600	3¾x5	36x6†	36x6†	W
Standard, 76	2½-3	3100	4½x5¼	36x4*	36x7*	W
Standard, 66	3½-4	4000	4½x5½	36x5	36x5d	W
Standard, 5-K	5-6	5250	4¾x6	36x6	40x6d	W
Sterling, 1½	1½	3200	4 x5¾	36x3½	36x5*	W
Sterling, 2	2	3500	4 x5¾	36x4	36x6	W
Sterling, 2½	2½	3650	4¾x5¾	36x4*	36x4d*	W
Sterling, 3½	3½	4650	4½x6¼	36x5*	40x5d*	W
Sterling, 5-W	5	5500	5 x6¼	36x6*	40x6d*	W
Sterling, 5-C	5	6000	5 x6¼	36x6	40x6d	C
Sterling, 7½	7½	6500	5 x6¼	36x6	40x7d	C
Stewart, 11	¾	1350	3½x4½	32x4†	32x4†	I
Stewart, 12	1	1750	3½x5	35x5†	35x5†	I
Stewart, 9	1½	2200	3¾x5	34x3½	34x5	I
Stewart, 7	2	2800	4½x5¼	34x4	34x7	I
Stewart, 7-X	2½	2950	4¼x5½	34x4	34x7	I
Stewart, 10	3½	3850	4½x5½	36x5	36x5d	I
Stewart, 10-X	3½	3850	4½x6	36x5	36x5d	I
Stoughton, A	1	1995	3¾x5¼	34x4½†	25x5†	W
Stoughton, B	1½	2350	3¾x5¼	36x3½	36x5	W
Stoughton, D	2	2800	4 x5½	36x4	36x7	W
Stoughton F	3	3600	4¼x5½	36x5	36x5	W
Sullivan, E	2	3350	4¼x5½	36x4*	36x7*	W
Sullivan, H	3½	4650	4½x6	36x5	36x5d	W
Superior, D	1	1800	3¾x5	34x4½†	34x4	I
Superior, E	2	2750	4½x5¼	36x4	36x6	I
Super Truck, 50	2½	3300	4 x6	36x4	36x8	W
Super Truck, 70	3½	4300	4¼x6	36x5	40x5d	W
Super Truck, 100	5	5300	4¾x6	36x5	40x12	W
Super Truck 150	7½	6300	5 x6	36x6	40x7d	W
Texan, A38	¾	1095	3½x5	33x4	33x4	I
Texan, TK39	1½	$1550	3½x5	36x6	38x7	W
Tiffin, F15	1½	2695	4¼x5¼	36x3½	36x5	W
Tiffin, F25	2½	3580	4¼x5¼	36x4	36x3½d	W
Tiffin, F35	3½	4760	4½x5½	36x5	40x5d	W
Tiffin, F50	5	5850	4¾x6	36x6	40x6d	W
Tiffin, F60	6	6050	4¾x6	36x6	40x12	W
Titan, HT	3½	4550	4½x6	34x4*	40x5d	I
Titan, HD	6	5400	4½x6	36x5	40x6d	I
Titan, TS	2½	3400	4¼x5½	34x4*	36x4d	I
Tower, J	1½	3000	4¼x5¼	35x5	38x7	W
Tower, H	2½	3475	4¼x5¼	36x4	36x7	W
Tower, G	3½	4400	4½x5½	36x5	36x5d	W
Traffic, C	2	1595	3¾x5	34x3½*	34x5*	I
Transport, 20	1	1850	3¾x5½	34x3½	34x4	I
Transport, 30	1½	2250	3¾x5	36x3½	36x5	I
Transport, 50	2½	2785	4¼x5½	36x4	36x7	I
Transport, 70	3½	4195	4½x6	36x5	36x10	I
Traylor, B	1½	2500	3¾x5½	34x3½	34x5	W
Traylor, C	2	3000	4 x5½	36x4	36x7	W
Traylor, D	3	3500	4¼x5½	36x4	36x8*	W
Traylor, E	4	4700	4½x6	35x5	40x10	W
Traylor, F	5	5100	4½x6	36x6	40x6d	W
Triangle, AA	¾-1	1600	3¼x5	35x5†	35x5†	I
Triangle, A	1½	2350	3¾x5¼	34x3½*	34x6*	I
Triangle, C	2	2700	3¾x5¼	36x4*	36x6*	I
Triangle, B	2½	2950	4 x5¾	36x4*	36x7*	I
Triumph, HB	2	2900	3¾x5¼	36x4	36x7	W
Triumph, HC	1½	2550	3¾x5¼	36x3½	36x5	W
Triumph, G	1	1995	3½x5½	34x5†	34x5†	W
Twin City, B.W.	2	3000	4 x5½	36x4	36x7	I
Twin City, A. W.	3½	4400	4¼x6	36x5	40x5d	W
Twin City, FWDB	3½	4750	5½x6	36x6	36x6	I
Twin City, FWDA	5	5250	5½x6	36x7	36x7	I
Ultimate, A	2	3200	4 x5½	36x3½*	36x5*	W
Ultimate, AJ	2	3250	4¼x5½	35x5†	38x7†	W
Ultimate, B	3	3750	4¼x5½	36x4*	36x4d*	W
Ultimate, BL	3	3850	4¼x5½	36x4*	36x4d*	W
Union, F W	2½	3490	4 x6	36x5*	36x8*	D
Union, H W	4	4485	4½x6	36x6	40x12	D
Union, J W	6	5800	5 x6	36x6	40x14	D
United, A	1½	2445	3¾x5¼	36x3½*	34x5*	I
United, B	2½	3150	4¼x5½	36x4*	36x7*	I
United, C	3½	3975	4¼x5½	36x5	36x5d	I
United, V	5	5100	4½x6	36x6	40x6d	I
U. S., N	1½	2475	3¾x5	36x3½*	36x5*	I
U. S., R	3	3795	4 x5¼	36x4	36x4d	W
U. S., S	4	4595	4½x5½	36x5	36x5d	W
U. S., T	6	5850	4¾x6½	36x6	40x6d	W
Velie, 46	1½	2200	3¾x5	36x3½	36x5	I
Veteran, E**	1-1½	3500	3¾x5¼	36x6†	36x6†	W
Veteran, A**	2-2½	4000	4¼x5½	36x4*	36x7*	W
Veteran, D**	2½-3	4400	4¼x5½	36x4*	36x7*	W
Veteran, H**	3½-4	5600	4½x6	36x5	36x5d	W
Victor, A	1½	2050	3¾x5	34x4	34x5	I
Vim, 29	½	1355	3⅞x4½	31x4†	31x4†	W
Vim, 31	1	2475	3¾x5½	35x5†	35x5†	W
Vim, 22	2	3150	3¾x5½	36x4	36x6	W
Vim, 23	3	3950	4¼x5½	36x5	36x5d	W
Vulcan, 25	2½	4000	4¼x6	36x4	36x8	W
Vulcan, 25P	3	4800	4¼x6	36x6	40x8	W
Walker-Johnson,B	2½	3500	4¼x5½	36x4	36x8	W
Walter, S	5	5600	4½x6½	36x5	40x6d	I
Waltham, E	1½	2350	3¾x5¼	36x6†	38x7†	W
Ward-LaF., 2B	2½	3590	4¾x5¾	36x4	36x7	W
Ward-LaF.,4A	3½	4690	4½x6¼	36x5	36x5d	W
Ward-LaF., 5A	5	5590	5 x6¼	36x6	36x6d	W
Watson, E	1	1865	3¾x5¼	34x4½†	34x4½†	W
Watson, N	3½	4250	4½x5½	36x5	36x10	W
Western, W1½	1½	2550	4¼x5¼	36x3½*	36x5*	W
Western, L1½	1½	2550	3¾x5	36x3½*	36x5*	W
Western, W2½	2½	3250	4¼x5¼	36x4	36x7	W
Western, L2½	2½	3250	4¼x6	36x4	36x7	W
Western, W3½	3½	4250	4½x6	36x5	40x5d	W
White, 15	¾	2600	3¾x5½	34x5†	34x5†	B
White, 20	2	3450	3¾x5½	36x4	36x7	D
White, 40	3½	4500	3¾x5¾	36x5	40x5d	D
White, 45	5	5000	4¼x5¾	36x6	40x6d	D
White, Hick., E	1	2450	3¾x5	34x5†	34x5†	W
White, Hick., H	1½	2750	3¾x5	36x3½	36x5	W
White, Hick., K	2½	3350	4¼x5¼	36x4	36x5	W
Wichita, K	1	2300	3½x5	36x3*	36x4*	W
Wichita, L	1½	2600	3¾x5¼	36x3½*	36x5*	W
Wichita, M	2	2800	3¾x5½	36x3½*	36x6*	W
Wichita, R	2½	3000	3¾x5¼	36x4*	36x7*	W
Wichita, RX	2½	3600	4¼x6	36x4*	36x8*	W
Wichita, O	3½	4000	4¼x6	36x5*	36x5d*	W
Wichita, S	5	5000	4½x6	36x6	40x6d	W
Wilcox, AA	1	2100	3¾x5½	36x4*	36x4*	W
Wilcox, B	1½	2775	4¼x5	36x4	36x5	W
Wilcox, D	2½	3300	4¼x5	36x4*	36x3½d*	W
Wilcox, E	3½	4250	4½x6	36x5*	36x5d*	W
Wilcox, F	5	5200	4¾x6½	36x5	40x6d	W
Wilson, F	1½	2650	3¾x5	36x3½	36x5	W
Wilson, EA	2½	3300	4¼x5¼	36x4	36x7	W
Wilson, G	3½	4300	4½x5½	36x5	36x5d	W
Wilson, H	5	5275	4½x5½	36x6	40x6d	W
Winther, 751	¾	1795	3½x5	34x4½†	35x5†	I
Winther, 430	1½	2850	3¾x5	32x4	32x4	I
Winther, 39	1½	2450	3¾x5	34x3½	34x5	I
Winther, 49	2	3250	4 x5	34x4	34x4d	I
Winther, 450	2½	3690	4 x5	34x5	36x6	I
Winther, 70	3½	4200	4 x6	36x5	36x5d	I
Winther, 109	5	5250	4½x6	36x6	40x5d	I
Winther, 140	7	5900	5 x6	36x6	40x7d	I
Witt-Will, N	1½	2750	3¾x5	36x3½*	36x5*	W
Witt-Will, P	2½	3250	4¼x5¼	36x3½*	36x7*	W
Wolverine, J	1	2240	3½x5	34x3	34x4	I
Wolverine, J	1½	2495	3¾x5	34x3½	34x5	I
Wolverine, J	2	2750	3¾x5	34x4	34x7	I
Wolverine, J	2½	3475	4¼x5¼	36x5	36x10	I
Wolverine, L	3½	4150	4½x5½	36x5	36x10	I
Yellow Cab M2	¾	2050	3¾x5	32x4	32x4	B
Yellow Cab M4	1¼	2350	3¾x5	34x4½	34x4½	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Kelly-S., Kelly-Springfield. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction. B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. §—Price includes several items of equipment.

*Nelson Le Moon

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One	12-25	$1975	3	Weid.	4-3¾x5½	GDK	2-3
Allis-Chalm..B	6-12	925	2	LeR.	4-3½x4½	Gas.	1
Allis-Chal.G.P	6-12	850	2	LeR.	4-3½x4½	Gas.	1-2
Allis-Chalm...	12-20	1495	2	Mid.W	4-4½x5½	Gas.	2-3
Allis-Chalm...	18-30	2150	4	Own	4-4¾x6½	GorK	3-4
Allis-Chalm...	10-18	875	4	Own	4-4¼x6½	G,K	4
Allwork...2-G	14-28	....	4	Own	4-4¾x6	GorK	3
Allwork.....C	14-28	....	4	Own	4-5 x6	GorK	3
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	GorK	4
Ano.....A	3-5	....	4	Own	1-4½x5	Gas.	..
Appleton....	12-20	1500	4	Buda	4-4¼x5½	G,K	2-3
Aro.....1921	3-5	550	4	Own	1-4½x5	Gas.	1
Aultman-T....	15-30	....	4	Clim.	4-5 x6½	G,K	4
Aultman-T....	22-45	....	4	Own	4-5½x8	G,K	6
Aultman-T....	30-60	....	4	Own	4-7 x9	G,K,D	8
Automot. B-3..	12-24	1785	4	Herc'ls	4-4 x5½	Gas.	2-3
Avery.SR.Cul..	5-10	....	4	Own	4-3 x4	G,K	..
Avery..Cult-C		....	3	Own	6-3 x4	G,K	..
Avery.....B	5-10	....	4	Own	4-3 x4	G,K	2
Avery.....C		....	4	Own	6-3 x4	G,K	..
Avery.....	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery.....	12-20	....	4	Own	4-4¾x6	G,K,D	2-3
Avery.....	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery.....	14-28	....	4	Own	4-4¾x7	G,K,D	3-4
Avery.....	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery.....	25-50	....	4	Own	4-6½x7	G,H,D	5-6
Avery.....	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates.....	15-25	....	4	Own	4-4½x6	Ker.	3
Bates....S.M.	15-22	....	*4	Own	4-4½x6	G,K,D	3
Bates Mule. F	18-25	....	*2	Midw	4-4½x5½	Gas.	3
Bates Mule .H	15-25	....	4	Midw	4-4½x5½	Gas.	3
Bates Mule G	25-35	....	*2	Midw	4-4½x6	Gas.	com.
Bean.....	8-16	....	*1	Own	14-3½x4	G,K	2-3
Beeman....G	2-4	340	4	Own	1-3½x4½	Gas.	½
Best.....	30	....	*2	Own	4-4¾x6½	G,K,D	4
Best.....	60	....	*2	Own	4-6½x8½	G,K,D	8-9
Boring...1921	....	1850	3	Wauk	4-4¾x5¾	GorK	2
Burn-Oil.1921	15-30	1650	4	Own	2-6¾x7	Ker.	3-4
Capital.....	15-30	1000	2	Own	4-4⅜x6	Gas.	33
Case.....	10-18	1090	4	Own	4-3½x5	GorK.	2
Case.....	15-27	1680	4	Own	4-4½x6	GorK	3
Case.....	22-40	3100	4	Own	4-5½x6¾	GorK	4-5
Caterpillar T11	25	....	*2	Own	4-4¾x6	Gas.	4
Caterpillar T16	40	....	*2	Own	4-6½x7	Gas.	6
Centaur.....	5-2½	495	2	N Way	2-4½x4½	G or K	1-9
Chase.....	12-25	....	3	Buda	4-4¼x5½	GorK	2-3
Chicago....40	40	2500	4	Own	4-4½x6	Gas.	4
Cletrac....W	12-20	1495	*2	Own	4-4 x5½	G,K,D	2-3
Dakota.....4	15-27	1750	3	Dom.	4-4¾x6	Gas.	3
Dart....B.J.	15-30	....	4	....	4-4½x6	Gas.	3-4
Depue.....A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill.....D	20	2480	4	Cont.	4-4½x5½	Gas.	3
Dill.....R.W.	20-	2980	4	Midw.	4-4½x6	Gas	3
De-It-All.....	4-6	595	..	Own	1-4½x5	Gas.	⅔
Eagle.....F	12-22	1390	4	Own	2-7 x8	GorK	3-4
Eagle.....F	16-30	1850	4	Own	2-8 x8	GorK	4-5
E-B.....AA	12-20	....	4	Own	4-4¾x5	GorK	4
E-B.....Q	12-20	....	4	Own	4-4¾x5	GorK	3
E-B.....	16-32	....	4	Own	4-5½x7	GorK	4
Evans.....	18-30	2000	4	Buda	4-4½x6	G,K	3
Fageol.....D	9-12	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse...	18-30	1885	4	Clim.	4-5 x6½	G,K	3-4
Farquhar.....	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar.....	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar.....	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch.....4	20-35	....	4	Clim.	4-5 x6½	GorK	3-4
Flour City....	20-35	....	4	Own	4-5¼x6	Ker.	4-6
Flour City....	30-50	....	4	Own	4-6¾x7	Ker.	6-8
Flour City....	40-70	....	4	Own	4-7½x9	Ker.	8-1
Fordson.....	... 20	625	4	Own	4-4x5	G,K	2
Fox.....E	20-40	1300	4	Own	4-5½x7½	G or K	4
Franklin BullG	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-3
Franklin Bull C	18-30	3350	*2	Clim.	4-5x6½	G or K	3-4
Franklin Bull G 2	18-30	4350	....	....	.....	....	....
Frick.....A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick.....C	15-28	....	4	Beav.	4-4¾x6	G,K	3-4
Fulton.....	10-20	1275	3	Wauk	4-4¾x5	Gas.	2

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
G-O.....G	14-28	$1485	4	Wauk.	4-4½x5¾	GorK	3
Grain Belt...A	18-36	2150	4	Wauk	4-4¾x6¾	GorK	4
Gray.....1920	18-36	....	3	Wauk	4-4¾x6¾	Gas.	4
Ground Hog..	19-31	2000	4	Erd.	4-4 x6	GorK	3
Gt. Western St	20-30	1950	4	Beav.	4-4¾x6	K.	4
Hart-Parr...20	-20	1195	4	Own	2-5¼x6½	K.D	3
Hart-Parr...30	15-30	1595	4	Own	2-6½x7	K,D	3
Heider.....D	9-16	....	4	Wauk	4-4¼x5¾	G,K	2
Heider.....C	12-20	....	4	Wauk	4-4½x6¾	G,K	3
Heider...Cult	6-10	....	4	LeR.	4-3½x4½	Gas.	1
Hicks.....	20-30	....	4	....	4-4½x6	KorG	4
Huber Light 4	12-25	1385	4	Wauk	4-4½x5¾	GorK	3
Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas.	3
Illinois, Super-Drive.....C	18-36	2500	4	Clim.	4-5 x6½	G,K	4
Imperial.....E	40-70	5000	4	Own	4-7½x9	G,K,D	10
Indiana.....F	5-10	....	2	LeR.	4-3½x4½	Gas.	1-2
International..	8-16	1600	4	Own	4-4¼x5	G,K,D	2
International..	15-30	1950	4	Own	4-5¼x8	G,K,D	4
J-T.....N	20-40	3485	*2	....	4-4¾x6	G,K	3-4
Klumb.....F	16-32	....	4	Clim.	4-5 x6½	....	..
LaCrosse...M	6-12	900	4	Own	2-4 x6	G,K	1
LaCrosse...G	12-24	1250	4	Own	2-6 x7	GorK	3
Lauson.....	12-25	1495	4	Midw.	4-4½x5½	Gas.	3
Lauson.....	15-25	1685	4	Beav.	4-4½x6	GorK	3-4
Lauson.....21	15-30	1985	4	Beav.	4-4¾x6	GorK	3-4
Leader.....B	12-18	1095	4	Own	2-6 x6½	G,K,D	2-3
Leader.....N	16-32	1985	4	Clim.	4-5 x6½	G,K	3-4
Leader...GU	18-35	2775	*	Clim.	4-5x6½	G,K	3-4
Leonard....E	20-30	2530	4	Buda	4-4½x6	G,K	3
Liberty.....A	18-32	2475	4	Clim.	4-5 x6½	G,K	4
Linn.....W	60	5600	*	Wauk.	4-5 x6¼	Gas.	6
Little Bear....	4	850	4	Ford	4-3¾x4	Gas.	..
Little Giant..B	16-22	2200	4	Own	4-4½x5	K.	4
Little Giant..A	26-35	3300	4	Own	4-5½x6	K.	6
Lombard.....	85-150	....	*2	....	6-5½x6¾	Gas.	16
Motor Macult.	1½	225	2	Own	1-2¾x3½	Gas.	..
Magnet.....B	14-28	1875	4	Wauk	4-4½x6¾	K&G	3
Master Jr.....	5-10	585	..	LeR.	-2¾x4	Gas.	1
MerryGar1921	2	230	2	Evin	1-2¾x2½	Gas.	..
Minne...All-P	12-25	1325	4	Own	4-4½x7	GorK	3
Minne.Gen.P.	17-30	.....	4	Own	4-4¾x7	GorK	3-4
Minne. Med.Duty	22-44	.....	4	Own	4-6x7	GorK	5-6
Minne. HeavyDuty	35-70	.....	4	Own	4-7½x9	GorK	8-9
Mohawk.1921	8-16	785	4	Light	4-3½x4½	KorG	1-2
Moline Univ D	9-18	1075	2	Own	4-3½x5	Gas.	2-
Moline Orch..	9-18	1075	2	Own	4-3½x5	Gas.	2-3
Monarch 3....	30-20	3400	*2	Beav.	4-4¾x6	G or K	4
Motox.....	15-30	2250	4	Buda	4-4½x6	Gas.	3-4
NB.....1	3-6	425	4	Own	2-3¼x4	Gas.	¾
NB.....2	3-6	425	4	Own	2-2¾x4	Gas.	¾
Nichols-Shep. 20-42	20-42	3100	..	Own	8 x10	GorK	3-6
Nichols Shep. 25-50	25-50	3460	..	Own	9 x12	GorK	4-7
Nilson Jr....E	15-25	1775	4	Wauk	4-4¼x5¾	G or K	3
Nilson Senior.	20-40	2675	5	Wauk	4-5 x6¼	G,K	4
Oil Pull....K	12-20	1485	4	Own	2-6 x8	K,D	3
Oil Pull....H	16-30	2285	4	Own	2-7 x8½	K,D	4
Oil Pull....G	20-40	3175	4	Own	2-8 x10	K,D	5-6
Oil Pull....E	30-60	4590	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2½-5	395	4	Own	1-5½x5½	Gas.	⅔
Oliver.....A	15-30	....	*2	Beav.	4-4½x6	GorK	3-4
Once Over Tiller Mark..6	12-25	3000	4	Strns	4-4½x6	Gas.	2
Parrett.....K	15-30	1950	4	Pitt	4-4½x6	G,K	3
Peoria.....L	12-25	1785	4	Clim.	4-5 x6½	G,K	3
Pioneer.....G	18-36	....	4	Own	4-5½x6	G,K,D	4
Pioneer.....C	30-60	....	4	Own	4-7 x8	Gas.	10
Planet Jr.....	5-10	950	2	LeRoi	4	Gas	1

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
Plowman....A	15-30	1995	4	Buda	4-4½x6	G,K	3-4
Port Huron..A	12-25	1700	4	Chief	4-4¾x6	G,K	3
Pest.....D	12-20	$1800	4	Wauk	4-4¼x5¾	GorK	2
Prairie Dog..L	9-18	650	3	Wauk	4-3¾x5¼	Gas.	2
Prairie Dog..D	15-30	1250	4	Wauk	4-4½x6¼	Gas.	3
Ranger Cul. T-20	8-16	....	4	LeR.	4-3½x4½	Gas.	1
Reed.....	15-30	2250	4	Dom	4-4¾x6	K.	3-4
Reed.....A-1	18-36	2400	4	Dom	4-5 x6	Gas.	4
Reliable.....	10-20	985	4	Own	2-6 x7	Ker.	2
Rex.....	12-25	1600	4	Wauk	4-4¼x5¾	GorK	3
Russell.....	12-24	....	4	Own	4-4½x5¾	GorK	2-3
Russell.....	15-30	....	4	Own	4-5 x6½	GorK	3-4
Russell.....	20-35	....	4	Own	4-5½x7	GorK	4-5
Russell.....	30-60	....	4	Own	4-8 x10	GorK	8-10
Samson....M	.....	995	4	Nov.	4-4 x5½	G,K	2
Sandusky...J	10-20	1250	4	Own	4-4¼x5¼	G,K,D	2
Sandusky...E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shawnee Com.	6-12	....	2	LeR.	4-3½x4½	Gas.	10
Shawnee Com.	9-18	....	2	Gray	4-3½x5	....	..
Shelby.....C	10-20	....	4	Erd.	4-4 x6	GorK	2-3
Shelby.....D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Short Turn....	20-40	1500	3	....	4-4¾x6	G,K	3
Square T....A	18-35	2075	3	Clim.	4-5 x6½	K,G	3
Steady Pull...	12-24	1485	4	....	4-4 x5	Gas.	3
Stinson....4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Stone.....	20-40	....	4	Beav.	.....	G,K	4
Tioga.....3	15-27	2625	4	Wisc.	4-4½x6	Gas.	3-4
Titan.....	10-20	1000	4	Own	2-6½x8	G,K,D	3
Tillermo....A	2-6	385	..	Vur.	1-4 x4	G,K	..
Topp.....B	30-45	3500	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6-10	....	3	LeR.	4-3½x4½	Gas.	2
Townsend.....	10-20	....	2	Own	4-6½x7	Ker	2-3
Townsend.....	15-30	....	2	Own	4-7 x8	Ker	3-4
Townsend.....	25-50	....	2	Own	4-8½x10	Ker	4-8
Traction Motor	40-50	....	4	....	8-3½x5	Gas.	4-5
Traylor....TB	6-12	815	4	LeR.	4-3½x4½	Gas.	1
Triumph....H	18-36	2450	2	Erd.	4-4¾x6	Ker.	4
Trundaar....10	25-40	4250	*2	Wauk	4-5 x6¼	GorK	4
Turner...1921	14-25	1295	4	Buda	4-4½x5½	G,K	3
Twin City.....	12-20	....	4	Own	4-4¼x6	G,K	3
Twin City.....	20-35	....	4	Own	4-5½x6¾	G,K	3
Twin City.....	40-65	....	4	Own	4-7¾x9	G,K	5
Uncle Sam C20	12-20	1385	4	Wid	4-4 x5½	G or K	8
Uncle Sam B19	20-30	2300	4	Beav.	4-4¾x6	G or K	2-3
Uncle Sam D21	20-30	2075	4	Beav.	4-4¾x6	G or K	3-4
Universal.....	1-4	475	2	Own	1-3½x5	G	1
Utilitor....501	2¼-4	380	4	Own	1-3½x4½	G	5-6
Velie..Biltwell	12-24	1750	4	Own	4-4½x5½	G,K,D	3
Victory...1921	9-18	1350	4	Gray.	4-3½x5	Gas.	2
Victory...1921	15-30	1750	4	Wauk	4-4¼x5¾	Gas.	3
Vim.....B	15-30	1650	4	Wauk	4-4¾x5¾	G,K	3
Wallis.....K	15-25	1600	4	Own	4-4¼x5¾	G,K	3
Waterloo....N	12-25	....	4	Own	2-6½x7	G,K	3
Webfoot....40	25-40	4000	..	....	.....	....	..
Webfoot....53	28-53	5250	*2	Wisc.	4-5¾x7	G,D	6
Wellington..B	12-22	1600	4	Erd.	4-4 x6	Ker.	2-3
Wellington..F	16-30	2100	4	Chief	4-4¾x6	Ker.	3-4
Western. 1920	16-32	2100	4	Clim.	4-5x6½	Gas.	4
Wetmore.....	12-25	1650	4	Wauk	4-4 x5¾	G,K	3
Wharton....E	12-20	1800	3	Buda	4-4½x5½	Gas.	2
Whitney.....	9-18	1175	4	Own	2-5½x6½	Gas.	2
Wichita.....T	15-30	2500	4	Bear.	4-4½x6	G,K,D	2
Wisconsin...E	16-30	....	4	Clim.	4-5 x6½	Ker.	3-4
Wisconsin...H	22-40	....	4	Clim.	4-5½x7	Ker.	4
Zelle.....	12-25	....	4	....	4-4¼x5½	GorK	5 3

ABBREVIATIONS; G—Gasoline. K—Kerosene. D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14-in. plows. LeR.—LeRoi. Clim.—Climax. Beav.—Beaver. Dom.—Doman. Cont.—Continental. Nor.—Northway. Wauk.—Waukesha. Wisc.—Wisconsin. T.C.—Twin City. Vur.—Vurac. Evin.—Evinrude. Midw.—Midwest. Weid.—Weideley. Com.—Commercial Tractor. *—Crawler type. All others are wheel type.

PRACTICAL TIRE MERCHANDISING AND REPAIRING

(*Continued from page 19.*)

plied. An over-cured tire will be hard and the tread will be brittle; the tire will not have proper resilience; in use it will wear quickly and the tread will crack.

An under-cured tire will be too soft; it will cut easily; the tread will separate from the carcass easily, and will show abnormal wear thousands of miles before a properly cured tire will.

Still another class of "seconds" are those that are marked "N. F. C." This designation means "not first class" and should be sufficient to warn the dealer and the purchaser away from it without further explanation. Suffice it to say that if the tire were perfect there would be no reason for branding it otherwise for there is more money for the manufacturer in selling perfect tires than there is in selling "seconds" at a much reduced price.

"SECONDS" NEVER GUARANTEED

Some "seconds" give fair mileage. Few give good mileage. The majority of them blow out prematurely, stone-bruise easily and give such poor service that purchasers seldom come back for more.

For the dealer who is handling "seconds" grief is spelled with a big "G." For though no "second" is guaranteed by the maker, and, presumably, is sold to the customer with that understanding, the latter is very likely to consider that he has a just cause for complaint if the tire fails to give more than a few hundred miles of service. The customer considers that he has been given a raw deal.

He may take either of two courses. He may shun the dealer thereafter, or he may demand some sort of an adjustment. In the latter case the dealer must either make an adjustment, relying on his ability to have the damaged tire repaired and sell it again for enough to compensate him for the expense of making the repair, or he may refuse an adjustment on the ground that the tire is a "second" and as such carries no guarantee of service.

In either case the transaction is unsatisfactory to the dealer and unsatisfactory to the customer.

(Next Week—Handling the Sales Force)

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Chicago	Used Automobile Show	May 7-15
Bangor, Me.	Automobile Show	May 9-14
Rocky Mount, N. C.	Annual Automobile Show	May 10-14
Greenville, S. C.	South Carolina Automotive Trades Association	July 20
Cincinnati	Fall Automobile Show	Oct. 1-8
New York	Automobile Salon	Nov. 27-Dec. 3
Chicago	Automobile Salon	January—1922

RACES

Indianapolis Speedway	500 Mile Race	May 30
Uniontown Speedway	Speedway Events	June 18
Cincinnati	Speedway Race (Possible)	July 4
Tacoma	Speedway Race	July 4
Le Mans	French Grand Prix	July 25
Elgin	Road Race (Possible)	August 3
Pikes Peak	Hill Climb	September 5
Uniontown Speedway	Annual Autumn Classic	September 5
Los Angeles	Speedway Race	November 24

FOREIGN SHOWS

Prague	Czecho-Slovak International Exposition	May 28, 1921
Basle, Switzerland	International Automobile Exhibition	May 28, June 8
Reykjavik, Iceland	Agricultural Machinery	June, 1921
Buenos Aires, Argentina	Passenger Cars and Equipment	September
Luxemburg	Luxemburg Agricultural Sample Exhibition	September
Paris, France	Paris Motor Show	Oct. 5-16
London	British Motor Show, Society Motor Mfrs. and Traders	Nov. 4-12

CONVENTIONS

Newark, N. J.	New Jersey Automotive Trade Association	May 12
Buffalo	Convention of Factory Service Managers, Auspices of Service Committee, N. A. C. C.	May 17-19
West Baden, Ind.	Summer Meeting Society of Automotive Engineers	May 24-28
Mackinac Island, Mich.	Summer Meeting Automotive Equipment Association	June 20-25
Chicago	Twenty-eighth Annual Convention National Implement & Vehicle Association	Oct. 12-14

Business Notes

W. H. Heylman has been made general manager of a new company formed in Spokane to take over the Spokane Motors Co., Packard representative. The president of the company is Thaddeus S. Lane.

The Rogers Auto Sweeper Co. has been incorporated at Columbus to manufacture automobile street sweepers. Howard C. Rogers is president and W. H. Duffy, director of public service of Columbus, secretary and treasurer. N. A. McCoy, one of the directors, is head of the Columbus street cleaning department. It is expected to get into production by July or August.

The Mason Tire & Rubber Co. and the Mason Rubber Plantations Co. stockholders are receiving letters from both corporations relative to the acquisition of the stock of the latter concern by the former. The Plantations company was formed by the directors of the tire company but when things were under way there was a slackness in the demand for tires and the sales of Plantations stock was stopped. In view of the fact that more than 90 per cent of the Plantations company are stockholders in the tire company and that the charter of the Plantations company, as a subsidiary corporation, will enable it to enter into the Far East development work at a later date, the directors have considered it practicable and desirable to effect an exchange of securities.

The Barco Battery Co., Detroit, has moved into its new plant which gives the company a production capacity more than four times as great as in the plant it has been occupying. The rapid pick up in the automobile business has resulted in a corresponding increase in the Barco output which necessitated the removal to larger quarters, officials say.

Thirty-six separate actions against as many stockholders of the defunct Interlocking Cord Tire Co. of Akron and Nogadore, have been filed in the common pleas courts of Summit Co., by Elihu Harpham, receiver of the company, for recovery of the balances due on their unpaid stock subscriptions. The actions constitute the forerunner of 480 similar actions to be started, according to Harpham, for an aggregate of $290,000, claimed to be due on subscriptions for stock, negotiated before the appointment of the receivership.

The Pennsylvania Piston Ring Co., Inc., Cleveland, began on May 9 to operate a full night shift in the production of Pepco and Instant-Pep-Co piston rings.

JOE BUSH
The SERVICE MAN
SAYS —
WHEN the boss sells a new car, it is but half sold. We fellows have to sell the other half, and then some.

The Oakes Co. of Indianapolis, manufacturer of radiator cooling fans and other automotive parts, has acquired the Toelle patent No. 1,339,075 which is a basic patent covering lock housings for screws and bolts. Utilizing this patent the company has perfected a new type of tire lock.

The Studebaker-Wulff Tire Co. will erect a new factory at Lincoln, Ill., for the manufacture of cord tires. Five hundred tires will constitute the daily output for the first year. Production at the present time is being maintained at Cicero, Ill.

The Paragon Motor Car Co. has moved from Connellsville, Pa., to Cumberland, Md. Philip W. Blake of Cumberland has been elected president and general manager as well as a director of the company.

The Alvord Reamer & Tool Co., Millersburg, Pa., has opened a branch office at 546 Washington boulevard, Chicago, which will carry a complete stock of all items manufactured. C. B. Cole is manager and with him are associated T. J. Davis and C. E. Block.

The Goodyear Tire & Rubber Co. Ltd. of Toronto, Canada, subsidiary of the Goodyear company of Akron, will be reorganized, it is announced. A bill has been introduced in the Ontario legislature providing for the reorganization. The Canadian company's assets are listed at $19,609,000 with liabilities considerably below that amount. Canadian banks are interested to the extent of $1,000,000.

The Motch & Merryweather Machinery Co. of Cleveland has taken over the sales of the Gordon cam turning lathe which is now being manufactured by the Willard Machine Tool Co. of Cincinnati.

The Iron City Products Co. of Pittsburgh, manufacturer of jacks, has changed its corporate name to the Rees Mfg. Co. The company is extending its line of automotive accessories and will manufacture the Rees bumper.

The Franklin Automobile Co., Syracuse, reports that business done by Franklin dealers the first twenty days of April exceeded by 10 per cent the volume of business done during the corresponding period of March.

The Hall Syndicate, Inc., a Delaware corporation capitalized at $1,000,000, organized to manufacture and sell the products controlled by the company whose factory is in Philadelphia, has opened sales and show rooms in Philadelphia and Camden, N. J.

The Phoenix Mfg. Co., Eau Claire, Wis., manufacturer of machine tools, has established a garage machine tool department under the direction of Joseph G. Worker, formerly with the Westinghouse interests at East Pittsburgh, who has joined the Phoenix company as vice-president and managing director. I. B. Roland, sales manager, will have charge of the sales of the products of the department. Distribution plans already have been effected.

The Peterson Corp., Los Angeles, has opened a branch store for re-built motor cars at Guadalajara, Mexico, and expects later to open a store in Mexico City. It feels that business conditions are promising in both cities.

The Stutz Motor Car Co. of America, Inc., has appointed the following dealers: Winnemac Motor Sales Co., Chicago; Stutz Motor Mart, Dayton, Ohio.

The Black & Decker Mfg. Co. announces that its Atlanta branch office is now located at 1508 Candler Building, where Thomas W. Peters, branch manager for the southern territory, will make his headquarters.

The Touring Car Bus Co. has been incorporated with an authorized capital of $200,000 to build and operate trucks, by R. S. Dimick, E. B. Dimick, Minneapolis.

The Johnson Automotive Co., Minneapolis $200,000 capital, has been incorporated by C. E. Sykes, 2800 Elliot avenue, Albert A. Johnson, and others.

The Oregon Lexington Co., a factory branch of the Lexington Motor Co. of Connersville, Ind., has been opened in Portland to handle the Lexington in the Pacific northwest territory.

The Hartford Rubber Works, Hartford, Conn., re-elected its board of directors at its annual meeting. Business at the plant has increased in the last few weeks to justify resumption of work in two shifts.

The Lockwood Mfg. Co., Kansas City, automobile accessory manufacturer, in bankruptcy, will continue to operate through the purchase of its assets by W. C. Sommerville, president, and Walter L. Wilson, vice-president and treasurer of the Baker-Lockwood Mfg. Co., Inc., of which it becomes a part. R. M. Secor will be salesmanager. Salesmen have continued on the territories and production has not been interrupted during the bankruptcy proceedings. The policy of selling to jobbers will continue. There will be special emphasis on service. The Buffalo plant will be used for eastern distribution but not for manufacturing.